# Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

13(7) PERIODICAL U. S. F. W. S.

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Vol. 13 No. 7 July 1960

Fish and Wildlife Service
U. S. Department of the Interior
Washington D. C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FRED A. SEATON, SECRETARY

FISH AND WILDLIFE SERVICE
ARNIE J. SUOMELA, COMMISSIONER

# Commercial Fisheries Abstracts

DIVISION OF INDUSTRIAL RESEARCH AND SERVICES
BUREAU OF COMMERCIAL FISHERIES

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

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3 Preserved fish
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8 Composition
9 Miscellaneous

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**Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.**

0.321 ELECTROPHORETIC AND ULTRACENTRIFUGAL STUDY OF PLAICE MYOGEN

Jebsen, J. W. and Hamoir, G. (Laboratory of General Biology of Liege, Belgium)
Acta Chemica Scandinavica 12, 1851-1868 (1958)

Using electrophoresis and ultracentrifugation, the authors have investigated the protein composition of water extracts of plaice muscle and the myogen of plaice muscle. They fractionated plaice myogen with neutral ammonium sulfate in the complete range of saturation and each of the fractions was analyzed by both electrophoresis and ultracentrifugation.

The salting-out range of the various electrophoretic and ultracentrifugal gradients was determined. The components that precipitated at the higher salt concentrations sedimented more slowly and migrated more rapidly in the electrical field than did those which precipitated at lower salt concentrations.

The authors have described the properties of two crystalline albumins. The isolation of a third component by preparative electrophoresis has demonstrated that a protein of abnormal amino acid composition that has been discovered in carp also occurs in plaice.

Although muscle extracts of low ionic strength are highly specific from an electrophoretic point of view, a more detailed study will make the common properties of their protein constituents more conspicuous.

See table, over.

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 ABSTRACTER: Kathryn L. Osterhaug

0.321 NATURE OF THE PROCESS OF DEGRADATION OF PROTEINS BY THE ACTION OF PROTEOLYTIC ENZYMES

Mosolov, V. V.
Biochemistry (U.S.S.R.) 24, 542-548 (July-August 1959)

In spite of the considerable advances that have been made in recent years in the study of proteolytic enzymes, many of the problems of the process of proteolysis remain unsolved. One of these unsolved problems is the nature of the process of breakdown of the protein molecule under the action of proteolytic enzymes.

Theoretically, three possible pathways of proteolysis may exist: (1) a progressive splitting off from the protein molecule of terminal, low-molecular hydrolysis products, (2) initial splitting up of the protein molecule into large fragments that are gradually degraded to the final product, and (3) "explosive" breakdown of the protein molecule as a whole, with the final products of the reaction being produced immediately. The first of these pathways appears to be characteristic of the peptidases, which detach terminal amino acids one by one. The second and third pathways probably apply to the action of the true proteinases. The object of the research presented here was to gain further information on the nature of the process of degradation of proteins by the action of proteolytic enzymes.

Paper electrophoresis combined with appropriate staining procedures, which gives a representation of all the products of hydrolysis at the same time, was the method used to investigate proteolysis. Human serum albumin was used as the substrate and crystalline pepsin as the enzyme. Digestion took place in acetate –HCl buffer at 37°. Electrophoresis was conducted in a horizontal tank, with water-cooling at a potential gradient of 20 to 22 v/cm., in borate buffer of pH 8.4, $\mu = 0.17$, strength of current 0.4 ma./cm. Ten $\mu$l. portions of hydrolyzate were applied to damp strips of slow chromatographic paper. After electrophoresis had been completed, the strips were placed in a drying

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 ABSTRACTER: Kathryn L. Osterhaug

0.36 THE STRUCTURE AND COMPOSITION OF SKELETAL MUSCLE

Hamoir, G. and McKenzie, H. A.
Food Preservation Quarterly 19, 62-66 (December 1959)

Striated skeletal muscle tissue constitutes 30 to 40 percent of the body weight of higher vertebrates. This type of tissue represents a greater proportion of the weight of the animal than does any other tissue. The skeletal muscle may be red or white depending on the amount of myoglobin present.

Mammalian muscle is enclosed in a sheath. Inside this sheath are elongated muscle cells called fibers, and between these fibers are fat deposits and connective tissue. The muscle fibers that form contractile tissue are several centimeters in length and their diameters range from 0.01 to 0.1 mm. They fuse at the ends with the tendon fibrils as can be seen in figure 1 (see over). Each fiber is enclosed in a membrane or sarcolemma. In some muscles, the fibers are parallel to the long axis of the muscle; in other muscles, the fibers are inclined.

The transverse striations in the muscle fibers are the results of alternating bands of materials of different refractive indices, the anisotropic A-band appearing bright under polarized light, and the isotropic band dark. Under ordinary light the reverse situation holds.

The contractile material of the muscle is located inside the muscle fibers in the form of thin, longitudinal fibrils. The fibrils are separated from each other by a sarcoplasmic gap about 0.5 $\mu$ across. Under the electron microscope the fibrils appear to be composed of thin threads called filaments. The thick filaments correspond, according to Hanson and Hurley (1955), to myosin, the thin ones, to actin.

When an isolated myofibril is treated with a solution that is able to extract myosin selectively,

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 ABSTRACTER: Kathryn L. Osterhaug

1.013 BRAZIL

Anonymous
Pacific Fisherman (International Yearbook Number) 58, 160 (January 25, 1960)

Brazil's enormous coastline, running through 40 degrees of latitude and 20 degrees of longitude and embracing the tropics and southern subtropics, holds obvious potential for industrial fishing of the first magnitude. Current developments there have already produced notable progress, and have confirmed a potential whose significance can hardly be overestimated. Shrimp and tuna, two species with almost magic ability to expand markets faster than supplies can be increased, appear at present to bear the greatest promise for the near future. There are, however, other resources which are being brought under development. These include whaling and bottomfish populations amenable to exploitation by trawling.

Only in recent years has Brazil moved from its traditional position as an importer of fishery products to that of exporter, a status which the nation will not soon relinquish. The 1959 fishery production and export program of the Brazilian government contemplated export of tuna alone to the volume of 15,000 tons and a value $9 million in United States money. Beginning in 1958, the Brazilian trade in shrimp--both canned and frozen--shot upward with vigor, and continues to grow at a remarkable rate. The trade in spiny lobster tails for export to the United States market also shows unmistakable signs of growth which is expected to be long sustained. The fishing fleets which operate along various sections of Brazil's coast have increased their catches to such large proportions that in only two years, fishery production of the Rio Grande de Sur area has increased 1,000 percent.

The Brazilian Government has established a program to increase fishery production, and subsequently the export of fishery products. The revenue from more exports will in turn further increase production. This increase in production is based on the use of modern fishing vessels manned by

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 ABSTRACTER: Reprinted in part

STUDY OF PLAICE MYOGEN

PROTEIN DIGESTION BY ENZYMES

COMPOSITION OF SKELETAL MUSCLE

FISHERIES OF BRAZIL

0.321

oven at 110° for 10 minutes and then were stained with 0.1 percent bromophenol blue in 96 percent ethanol saturated with mercuric chloride. The washed and dried electrophoretograms were analyzed in a densitometer. The content of each electrophoretic fraction was calculated by measuring the area under the corresponding peak of the densitometer curve.

Treatment with ninhydrin revealed the same components as did staining with bromophenol blue, but the intensity of color given by ninhydrin was much less. Nonprotein nitrogen was determined in the filtrates by precipitating the proteins with trichloroacetic acid to a final concentration of 5 percent. Amino nitrogen was determined by formol titration. Total nitrogen was determined by macro-Kjeldahl method.

Results and summary.--By the application of paper electrophoresis to the study of the process of digestion of serum albumin by pepsin, the authors were able to show that the protein molecule breaks down in a stepwise manner. This is also shown by an examination of the ratios of increase of amino nitrogen to nonprotein nitrogen during proteolysis. The stepwise course of the process of breakdown of protein molecules follows logically from the concept of the globular protein molecule as an integral unit, in which each single opening of a peptide bond should cause perturbation of the energetic equilibrium of the molecule and hence the formation of a new, discrete compound.

1.013

well-trained technicians, and on the continuing studies of Brazil's marine fauna.

Whaling bears promise of real importance in Brazil's utilization of its marine resources. In the 1958 season the catch was 125 whales, but the government's program for the 1959 season contemplated 500 whales.

From the point of view of tonnage, waters of southern Brazil contain enormous quantities of hake, specifically Merluccius merluccius hubbsi. In this they share abundance with the neighboring seas off Argentina, and Chile on the west coast of South America, although the hake of this latter area are of a slightly different species. In addition to the hake, other "school fish" species include sardinella, used widely throughout the world for sardine canning or for reduction to fish meal and oil.

Although the growth in Brazilian fish exports has been notable, much of the recent growth in fish utilization has been based on the domestic market and its avid demand for tuna and such pelagic species. An important part of this domestic fish supplying business is based on Santos, from where a Japanese-Brazilian company operates a fleet of modern trawlers which produce both bottomfish and shrimp.

Refrigeration for these catches is provided at Santos, from where they are shipped to market primarily in Sao Paulo.

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Table 1.--Content in albumins and globulin X of plaice muscles (g. protein/100 g. fresh muscle)

| Experiment number | A1/ | | | B2/ | | |
|---|---|---|---|---|---|---|
| | $Q_{sol.}$ at $\mu$ 0.05 pH 7.5 | $Q_{sol.}$ at $\mu$ 0 | percent globulin X | $Q_{sol.}$ at $\mu$ 0.005 pH 7.5 | $Q_{sol.}$ at $\mu$ 0 | percent globulin X |
| 1 | 2.00 | 1.44 | 28 | | | |
| 2 | 1.70 | 1.06 | 38 | | | |
| 3 | 1.81 | 1.43 | 21 | 2.53 | 1.98 | 22 |
| 4 | 1.95 | 1.58 | 19 | 2.50 | 1.97 | 21 |
| 5 | 1.87 | 1.44 | 23 | | | |
| 6 | 2.19 | 1.61 | 26 | | | |
| 7 | | | | 3.32 | 2.26 | 32 |
| 8 | | | | 3.18 | 1.92 | 40 |
| 9 | | | | 3.28 | 2.08 | 37 |
| Mean | 1.92 | 1.43 | 25 | 3.26* | 2.04 | 36 |

Carp white muscle. Mean (from Hamoir).

1/ Extraction with one vol. of water and subsequent dialysis against $\mu$ 0.05 of pH 7.5 or water.

2/ Successive extractions with one, two and one vol. of water and subsequent dialysis against $\mu$ 0.05 of pH 7.5 or water.

* Mean of experiments 7, 8, and 9. The lower values of experiments 3 and 4 are apparently due to a partial extraction of the globulins.

0.36

the anisotropic bands become less dense and their birefringence disappears, but the myofibril does not fall to pieces at the H-zone. Something other than myosin must exist in this region to keep the myofibril together.

Reaction of muscle constituents.--The interplay of the different muscle constituents involved in contraction has been well summarized by H. E. Huxley (1956a, 1956b) in the following sentences: (1) the contractile structure is built largely out of two proteins, actin and myosin; (2) some sort of combination can occur between actin and myosin; (3) this combination is modified by the presence of adenosinetriphosphate (ATP); (4) myosin is an enzyme for the dephosphorylation of ATP; (5) the dephosphorylation of ATP is linked closely with the release of energy for contraction; (6) the presence of ATP without dephosphorylation makes the contractile structure extensible; (7) other substances, like ATP, that dissociate actomyosin, also make the contractile structure extensible; and (8) in the absence of ATP or other plasticizer, the contractile structure becomes rigid and inextensible.

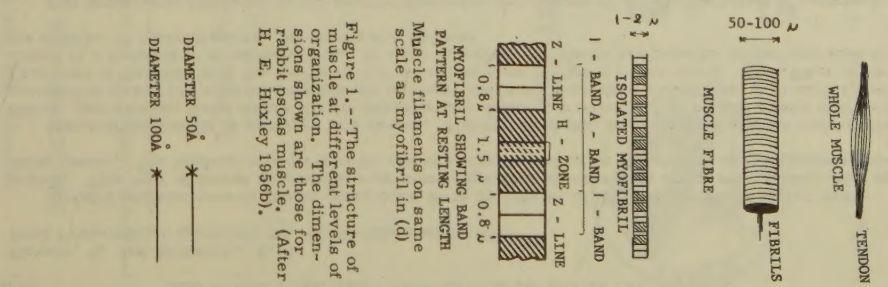


Figure 1.--The structure of muscle at different levels of organization. The dimensions shown are those for rabbit psoas muscle. (After H. E. Huxley 1956b).

Muscle filaments on same scale as myofibril in (d)

0.36 BIOCHEMISTRY OF CHICKEN MUSCLE AS RELATED TO RIGOR MORTIS AND TENDERIZATION

De Fremery, Donald and Pool, Morris F. (Western Regional Research Laboratory, Albany, California)
Food Research 25, 73-87 (January-February 1960)

Introduction.--The chemical and physical reactions that occur in muscle post mortem have been investigated by Bate-Smith and Bendall (1939, 1947, 1949, 1951) and by several groups studying muscle contraction. Experiments performed on rabbit muscle by Erdos (1943) and confirmed by Bate-Smith showed that the chemical event most closely linked with the onset of rigor mortis is the disappearance of adenosine triphosphate. In living, respiring muscle, a high level of adenosine triphosphate is maintained by oxidation of organic compounds. When the animal dies and oxygen is no longer available to the cells, adenosine triphosphate and creatine phosphate, a reservoir of phosphate-bond energy, can be maintained only by anaerobic glycolysis. After the muscle glycogen has been utilized, the adenosine triphosphate concentration decreases rapidly and the muscle passes into rigor mortis, a state characterized by a sharp increase in the elasticity of the muscle and the development of a rigid, nonplastic texture. Bendall (1951) demonstrated the disappearance of creatine phosphate before there were any changes in muscle texture and concluded that this compound played no part in the development of rigor mortis other than to act as a reserve of phosphate-bond energy. The production of lactic acid from glycogen causes the pH of meat (initially at pH 7 or above) to drop to a final pH level between 5.5 and 6.0. The chemical and physical changes described above are more fully reviewed by Bate-Smith (1948).

Biochemical methods.--The present paper is concerned with the biochemical changes that occur in chicken muscle post mortem and their relation to the development of tenderness. As a first step in elucidation of the biochemistry of rigor mortis and its relation to tenderization in fowl, metabolites known to be subject to rapid post-mortem change in other species (glycogen, lactic acid [pH],

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 ABSTRACTER: Martin Heerdt

1.0144 POLAND

Ganowiak, Henry
Pacific Fisherman (International Yearbook Number) 58, 172-175 (January 25, 1960)

After World War II, Poland regained access to the sea, which made it possible to develop a fishing industry. At the end of the war in 1945, the ports along the Baltic coast were either burned out or in ruins and only a few old boats and a number of recovered sunken coastal vessels were available. In June 1945, 3 cutters and 60 boats were in operation, and they caught 67 tons of fish during the first few months of operation.

A deficit of animal protein combined with the slow and expensive development of meat production made the development of the sea fisheries of great importance. Because the resources of the Baltic fishing grounds are limited, it was necessary to develop a deep-sea fishery. Since 1952 a number of deep-sea fishing vessels have been built. In 1958, the landing of fish in Poland amounted to 127 thousand metric tons from Baltic and deep-sea fishing grounds.

The current catch per capita amounts to about 9.7 pounds, which corresponds to a real consumption of some 6.6 pounds. To supply an adequate amount of animal protein is a serious project for Polish agriculture and fisheries. The part played by the fisheries is particularly important because animal protein can be supplied from fishery sources in a shorter time and at a lower cost than it can by agricultural means.

The Polish fishing fleet operates out of seven major ports: Gdynia, Swinoujscie, Szczecin, Wladyslawowo, Leba, Ustka, and Kolobrzeg. The total tonnage of the Polish fishing fleet reached 54,000 gross tons by 1959 and the expected catch for that year is about 147 thousand tons of fish. The fishing fleet consists of 40 distant-water trawlers, 15 smaller trawlers, 50 drifter-trawlers, 3 drifters, 75 cutters of 24 meters length, 152 steel cutters, 240 small cutters, 396 deck and half-deck

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 ABSTRACTER: Kathryn L. Osterhaug

1.01113 BRITISH COLUMBIA'S SHRIMP FISHERY

Cameron, H. A.
Trade News 12, 11-13 (February 1960)

Five species of shrimp are found in British Columbia waters. They include (1) the side-stripe or giant-red, (2) the pink shrimp, (3) prawn or spot, (4) hump-back or king shrimp, and (5) the coonstripe shrimp. The small pink shrimp comprises the bulk of the shrimp meat marketed in Vancouver, B. C. The prawn is the largest of the commercial shrimp and is the only species taken in quantity by trap.

The commercial shrimp are fished at depths ranging from 15 to 70 fathoms. Species that generally are found on muddy or sandy bottom are caught by trawling, towing a bag-shaped net over the bottom. The trawl net is conical in shape, open at one end, and tapers to an apex at the other end. As the net is towed along the bottom, shrimp are gathered in the mouth of the net and passed into the apex or cod end.

Two methods of trawling are used in the shrimp fishery--otter trawling and beam trawling. In the majority of shrimp boats that are operated on a one-man basis the easily handled beam trawl is preferred by the fishermen. The larger two-man boats that are about 40 feet in length generally use the otter trawl.

Fourteen shrimp boats fish the waters around Vancouver on a year-round basis. This fleet, which supplies the Vancouver fresh-shrimp market, pays the fishermen an average of 15 cents per pound for whole shrimp and a dollar per pound for shelled shrimp. The boats average between 140 and 290 pounds per day with tows, each of which last from 2 to 3 hours.

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 ABSTRACTER: Kathryn L. Osterhaug

1.0162 UGANDA

Achieng, Aloys P.
Pacific Fisherman (International Yearbook Number) 58, 177-178 (January 25, 1960)

Uganda is a British Protectorate in East Africa. It lies astride the Equator and is bounded by Sudan on the North, Kenya on the East, Tanganyika on the South, and the Belgian Congo on the West.

The industry is manned mostly by Africans, and provides full or part-time employment for some 15,000 people. About 30 Europeans are engaged in fisheries research and development. Most of these are government officers, though a few are active in the distribution of nets and motors. A number of Asians also find employment in the industry. Fishing craft number about 4,000, many of which are still hand propelled. Others use small sails in addition to being propelled by paddles. The more progressive fishermen have fitted their craft with outboard engines, and others are keen to obtain fully powered craft.

The catches include many types of fish, ranging from the lung-fish (Protopterus) to the butter fish (Schilbe) and the elephant-snout fish (Motmytus). All have a ready sale in the African market. The Ngege (Tilapia spp.), however, is the most important species economically and is popular with all races. In the Western Province of Uganda are some of the most productive lakes in the world--Lakes George, Nakivali and Kachira, and these yield unusually large crops of Tilapia. The yield from Uganda waters has increased steadily as can be seen from the table.

| Year | Annual production (in tons) | Landed value (in $) |
|---|---|---|
| 1955 | 24,850 | $2,758,000 |
| 1956 | 44,950 | 5,008,360 |
| 1957 | 48,318 | 5,195,400 |
| 1958 | 52,638 | 5,863,894 |

Much of the increase in fish production is due to a rapid shift to nylon and terylene (dacron) nets and

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RIGOR MORTIS OF CHICKEN MUSCLE

BRITISH COLUMBIA SHRIMP FISHERY

POLISH FISHERIES

FISHERIES OF UGANDA

1.01113

In order to better observe the shrimp fishing operation, the author boarded a shrimp boat that had been slowly beam-trawling back and forth across the inlet at a speed of 2 knots for the past 3 hours. The fisherman had his beam trawl 35 fathoms deep and extending 120 fathoms astern, and he was in the process of reeling in onto the drum.

The fishing operation is nearing completion when the bridle ropes appear over the stern. When this happens, one end of the beam pole is freed and taken aboard the boat. As the trawl net is brought closer to the stern, upended, and run forward, the beam is in a cradle position alongside the wheelhouse until the other end can be untied. The head and sole lines then are brought alongside to a point where the sole is pulled over the gunwales, and the cod end of the net where the shrimp are trapped is brought to the surface and the contents are brailed by hand into a sorting box.

Cooking the shrimp is the next step in handling the shrimp. The shrimp are packed into a wire basket and the basket is placed in a tank of boiling salt water for 5 or 6 minutes to cook the shrimp. The shrimp are then cooled in salt water and drained. The cooked and cooled shrimp are taken to a shucking plant after the shrimp boat docks later in the day.

1.0162

outboard engines. In 1957, there were 700 outboard engines in use. At the end of 1958 there were 1,200. Experiments conducted by the Game and Fisheries Department have shown that nylon and terylene nets have a greater catching power than the flax and cotton nets used in the past. On Lake Nyamsigeri (a small lake in Western Uganda) a closely controlled experiment showed that a best quality flax net fished effectively for 20 days while a nylon net lasted 116 days. Neither net was repaired during the experiment. It is interesting to note that most of the shift to more modern types of gear and propulsion was accomplished without direct financial help from the government. The sale of nets, engines, and other fishing gear is now a thriving industry in Uganda.

Most fish is salted, sun dried or hot smoked before marketing. Hot smoked fish are more popular than salted fish in the Uganda markets, but both find a ready sale in the Belgian Congo. Processing is carried out by the fishermen themselves. At Katwe and Lake Edward (Western Uganda) there are African and Asian-owned processing plants which have permanent buildings and concrete salting vats. The quality of the fish produced is good. One Asian concern has already installed a quick freezing plant at Katunguru (near Lake George) in view of the increasing popularity of fresh fish in the African markets. The Uganda Fish Marketing Corporation (TUFMAC for short) had previously established a modern processing plant on Lake George, for freezing, salting and smoking fish. It operates a blast freezer which enables it to produce quick-frozen Tilapia fillets, distributed by air to larger centers in East Africa. The same organization supplies buyers from the Belgian Congo, and also sends fresh fish by road to other parts of Uganda. TUFMAC recently (1956) installed a fish meal plant at the Lake George factory, and high quality meals are now being produced from whole lung-fish (Protopterus) mixed with offal and frames of Tilapia resulting from the filleting process, which had previously been thrown away.

In 1958 Uganda's exports of salted, smoked, dried and frozen fish totalled 12,000 tons (fresh equivalent) valued at $1,212,400. The exports included fish meal from the TUFMAC plant. In the same year approximately 50,000 tons of fish (including imports) were sold for consumption within Uganda. This figure represents a per capita fish consumption of about 16 lbs. per annum.

0.36

adenosine triphosphate, and creatine phosphate) were followed under various environmental conditions in freshly slaughtered chicken muscle. Changes in the modulus of elasticity as the muscle passed into rigor mortis also were followed under these same conditions and the effects of these environmental conditions on the final tenderness of the muscle were determined. The studies were conducted on 3- to 4-pound, meat-type, chicken fryers.

Biochemical findings.--Certain relationships, such as correlation between loss of adenosine triphosphate and the onset of rigor mortis, were found to be qualitatively the same for chicken as have been reported for other species. At room temperature, muscle from 10- to 16-week-old chickens pass into rigor mortis 2 to 4½ hours post mortem and reach an ultimate pH of 5.8 to 5.9. Under the experimental conditions used, the initial concentration of adenosine triphosphate averaged 4.8 mg. per g. of muscle.

Physical methods.--Physical changes associated with rigor mortis were followed by measureing the relative extensibility of muscle strips. This investigation included a study of the effects of a number of variables on muscle toughness, the rate of change of pH, and the rate of loss of adenosine triphosphate, which is closely correlated with the rates of onset of rigor mortis. The variables included excising the muscles prerigor, mechanical beating, post-mortem environmental temperature, freezing and thawing of fresh muscle, exhaustive electrical stimulation, electron irradiation, and lethal injections of sodium monobromoacetate.

Physical findings.--Every treatment that resulted in more rapid loss of adenosine triphosphate (more rapid development of rigor mortis), more rapid drop of pH, and more rapid loss of glycogen also induced increased muscle toughness. Injection of sodium monobromoacetate, which causes rapid loss of adenosine triphosphate but only a small decrease in pH and glycogen,failed to induce toughness.

1.0144

motor boats, 24 lug-sail boats, and 456 rowing and sailing boats.

The latest development in Poland's fishing fleet is the use of 80-ft. steel boats on the Baltic and North Sea fishing grounds. Experience has demonstrated that the steel-hulled vessels are cheaper and more efficient to operate than the wooden-hulled vessels. The steel boats reach a speed of 10 knots and trawl at 3 knots. They carry a crew of nine men. The amounts of fuel oil, water, and provisions allow a 15-day working period at sea and a range of 3,600 miles.

The holds of the steel boats allow for the stowage of about 700 40-kg. boxes of fish. During the first, second, and fourth quarters of the year these boats are used on the Baltic to fish cod, herring, flounder, and sprats. During the third quarter they are used for herring fishing in the North Sea.

According to information received from the Maritime Fisheries Institute at Gdynia, 24,000 persons are at present employed by Polish fisheries, 8,000 of these being employed on the sea and 16,000 being employed on shore in the fish processing plants and canning factories. Apart from the above, 6,000 persons are engaged by the fisheries in the shipyards, the net and packing factories, design offices, schools, and radio service. There is an average of four persons employed on shore, for every man employed at sea.

2.113 THE PROBLEM OF PAINTING RUSTY STEEL

Mayne, J. E. O. (Department of Metallurgy, The University, Cambridge, England)
Journal of Applied Chemistry 9, 673-680 (December 1959)

Introduction. -- This paper is concerned with the problem of painting steel, which has become rusty by exposure to the atmosphere. It is recognized that the application of paint to such rusty surfaces is a speculative venture, since the paint sometimes behaves remarkably well and at other times it all falls off in a few months. The object of the investigation was (1) to find out why a rusty surface behaves in this unpredictable manner and (2) to develop a simple test that indicates whether a rusty surface is in a suitable condition to be painted, or whether a mechanical or chemical treatment of the rust is necessary.

The problem of painting rust is allied to the problem of painting broken mill-scale. Broken mill-scale is one of the most undesirable surfaces to paint because some of the scale is certain to be partially undermined by corrosion. The adhesion of broken mill-scale may be sufficient to prevent its removal by wire-brushing; however, after only a short period of exposure, undermining may continue to the point that the residual scale flakes off and carries the paint away. The easiest way to remove mill-scale is to allow it to weather. This may take one or more years according to the conditions of exposure, and the resulting surface will be very rusty. A solution to the problem of painting rusty surfaces may also solve the mill-scale problem.

Findings. --In a previous investigation, Mayne (1954) found that the durability of paint applied in the summer was much greater than the durability of paint applied in the winter. Rust is essentially a hydrated iron oxide that does not differ appreciably from some of the pigments used in paints. If other compounds are not present on a rusty surface, it should be possible to formulate paints in which the rust will become incorporated into the paint film and yield a satisfactory coating.

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 ABSTRACTER: Martin Heerdt

2.117 THE ALL-PURPOSE FISHING BOAT

Anonymous
Fish Boat 5, 25-27, 52 (March 1960)

Unlike people in most industries, where the trend is toward increased specialization, fishing-vessel operators are faced with the problem of overspecialization. Too many boats have been built for a single purpose rather than for diversified fishing. A versatile fishing vessel is one that is capable of engaging in the largest number of basic fisheries with the least inconvenience in change-over and with a minimum sacrifice to the craft's characteristic operational features.

A versatile vessel is not only of advantage to operators and fishermen, but also to boat builders and gear manufacturers. With increased earning power, the operator can afford to build a vessel that is superior in all respects and, since the versatile vessel is not subject to loss of value if the stock of a specific fishery is depleted by seasonal failures or market conditions, the resale value will be more stable. Stable conditions would enable boatyards and gear manufacturers to settle down to long-range projects, which would result in an advantage to the customer who would be able to buy a fully developed product for a price that reflects actual value rather than the law of supply and demand.

An illustration of what can be accomplished in the way of a versatile intergrated vessel is contained in the plans for a 69-foot fishing boat that is capable of double-rig shrimp trawling, purse-seining, otter-trawling, and long-lining. Features include separate single-drum hydraulic driven and operated winches, a hydraulic-powered swivel crane positioned for full operating range to serve a number of functions that include hoisting trawl cod ends and trynets, brailing (by pump for small fish species), and strapping purse-seines and drift nets. The crane is also intended for use with a power block for purse-seining, long-lining, or hauling crabpots. A split-hold arrangement in

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 ABSTRACTER: Harold C. Johnson

2.117 GLASS FIBRE HULLS FOR FISHING BOATS

Anonymous
World Fishing 9, 22-23 (April 1960)

Q. Is glass reinforced plastic strong enough for fishing boat hulls?
A. Yes! Correctly processed under proper conditions, this material is, weight for weight, stronger than wood and compares favorably with steel or aluminum.

Q. Does glass reinforced plastic wear well?
A. Resistance to abrasion or chafe is similar to that of good close-grained wood.

Q. When the hull is damaged, can effective repairs be made readily in the ship's home port?
A. Provided that the manufacturer's instructions are carried out implicitly, any reliable workman should be able to make effective repairs.

Q. Will there be any frames or other stiffeners built into the hull, and will there be much more space inside the ship?
A. It is usual to incorporate stiffened sections in the construction and these can be much smaller than the equivalent members in traditional forms of construction, but there are several factors, other than strength requirements, which determine the size of frame members advisable. For instance, it is necessary to have the vessel registered below a certain gross tonnage measurement, for crewing and other considerations, and as tonnage accounts for the internal capacity of the vessel, then the frames must be made as deep in sections as they are in normal construction, or the outside dimensions of the ship must be made smaller, in order to maintain the correct tonnage measurement.

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2.117 FIBERGLASS FISHING BOATS

Anonymous
Fish Boats 5, 26-27, 48-49 (April 1960)

Fiberglass gillnet fishing boats will be introduced into the United States fishing fleet during 1960. Five 32-foot fiberglass gillnets are under construction in Seattle, Washington. Three of the new boats are for Bristol Bay service and the other two are for individual fishermen who will fish in State of Washington waters this summer.

The profile of the gillnetters show a handsome craft with an attractive sheer, a modified cruiser bow, and the popular "barrel-roll" rounded form. The boats have molded stern with rake, similar to pleasure craft transom stern design. The combination trunk cabin and steering shelter is located well forward, as is usual with craft of this type.

The gillnetters measure 32 feet in overall length, 10½ feet in beam, and about 2 feet, 5 inches in load waterline draft. The boats will have a capacity of about 4,000 seven-to-eight-pound salmon. The fish hold is immediately aft of the cabin and the twin 80-gallon fuel tanks are located further aft. Four of the boats will be powered by single 177 h.p. gasoline engines, the other boat may have diesel power. The gas-engine driven boats are expected to have a maximum speed of 20 knots, unloaded.

The 32-foot length was determined by the fact that this is the largest size gillnet boat allowed to fish in Bristol Bay under federal regulations. The three boats that are to fish in Bristol Bay will be operated for the owners of a salmon cannery. Because they plan to store the boats during the winter in a warehouse that has restricted clearance, these boats will have removable wheelhouse shelters above the main cabin.

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 ABSTRACTER: Kathryn L. Osterhaug

2.117

Q. Most plastics are made up under heat and great pressure. Are cold molded plastics as completely resistant to water soakage and decay as the plastics to which we are accustomed?
A. It is very doubtful if a claim can be made that cold plastics are as completely impervious as the thermal setting types, but the difference is one of degree only. Water soakage in a properly manufactured cold-molded hull can be ignored and there is no question of damage by fungicidal attack.

Q. Is it true that plastic hulls do not need painting?
A. In so far as is required for protection, plastic hulls do not need to be painted. Colors can be built into the hull, but care should be taken in the choice of colors as some pigments fade, and any repairs made will show up.

Q. How will the hulls be fitted out internally?
A. In much the same way as normal hulls. Cabin linings and furniture will be secured to wood cleating in the normal way. Light battens--and bearers--can be fastened to the hull with wood screws. Special pads, stringers, and webs will be built in to carry bulkheads, bearers, etc. Fishrooms can be lined in any material considered suitable. Cement may be used to provide a smooth fishroom floor.

Q. Will hull insulation be required?
A. Glass reinforced plastics have fairly good thermal insulation properties, and internal condensation should be at a minimum. Fishroom insulation would be valuable and some builders might advise a sandwich construction with insulation built in.

Q. Can engine seats be made sufficiently rigid and secure, and are built-in tanks satisfactory?
A. Steel webs are molded in to form engine seats and are a solid integral part of the structure.

2.117

The cost of building the fiberglass boats is said to be about 10 percent more than the cost of a comparable wooden boat. Savings in maintenance costs are expected to offset this extra cost within 2 years. The builder has called attention to a number of advantages inherent in fiberglass boats. These advantages include ease in repairing, permanence of hull color and finish, the fact that fiberglass boats do not soak up water and are easy to keep clean.

According to the builder, it is a rule of thumb that any thickness of fiberglass is six to eight times as strong as the same thickness of plywood. The new gillnetters have a minimum hull thickness of 3/8 inch fiberglass. The usual yacht-building practice of using full length panels of woven roving for the hull has been avoided. By using shorter panels, it is possible to build up additional sectional strength where it is desired and to build up flat areas that have a tendency to flex under impact.

With a fiberglass hull it is possible to do things that are not feasible in a wooden boat. For example, the new gillnetters feature a recessed channel for the keel cooler for the engine cooling system. Additional longitudinal strength is provided by the $2\frac{1}{2}$-inch net fir engine stringers that extend from the stern well into the cabin forward. The boats also have three $\frac{3}{4}$-inch marine plywood bulkheads, one for the forepeak, one at the aft end of the trunk cabin space, and the third separating the fish hold from the net locker and clearing bins aft. The bulkheads are covered with fiberglass in the fish hold only. The fish hold hatches are of $\frac{3}{4}$-inch plywood.

Admittedly there are fishermen who wonder how the fiberglass gillnetters will stand up under the severe conditions of use in Bristol Bay. The author feels that any problems will be ones of development with improvements based on observations of the first boats to correct for any possible weaknesses.

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Cambridge rust is variable in composition, but it always contains ferrous sulphate. The amount of ferrous sulphate that is present varies with the season, and the total quantity is about 3.7 mg. per sq. in. in January and 1.0 mg. per sq. in. in July. According to the author, a casual relationship probably exists between the durability of the paint and the quantity of ferrous sulphate present in the rust. Proof of this relationship has been obtained from a limited number of experiments that were carried out only in Cambridge, which is not in a coastal area where some of the ferrous sulphate may be replaced by ferrous chloride. These findings suggest a need for studies to determine the durability of paint that has been applied to rust, which contains different quantities of ferrous sulphate. The author believes that a total ferrous sulphate value of 1 mg. per sq. in. may be low and that certain paints may be able to tolerate larger quantities.

If this conclusion is true, then a surface that contains an excess of ferrous sulphate will require cleaning. This may be accomplished by continuous washing combined with repeated mechanical wire-brushing. In some cases, it will be necessary to remove, or at least shatter, the layer of compact rust by sand-, grit-, or shot-blasting. Other methods of compact rust removal include the use of flexible disc grinders or a pneumatic device that pounds the surface with hardened steel needles and is followed by mechanical wire-brushing in a continuous stream of water. Changes in the ferrous sulphate content of the metal may be measured by means of a limpet cell.

Conclusions.--Further laboratory work is not warranted, therefore, the problems should be incorporated into field studies.

2.117

connection with a chilled sea-water system offers many possibilities for saving in good condition small catches of different species until sufficient volume has been collected to make the trip worth while.

Stress is placed on efficiency: the operation of the automatic spooling winches as well as the crane can be handled by one man. With the split-house arrangement and open deck space cut to a minimum, the working area is protected even in adverse weather. The poop also offers many advantages, it can be boarded off to serve as a bin for purse-seining. When trawling, the contents of the cod end can be emptied into the poop-hatch where it can be sorted, protected from the weather, and from being washed overboard. When line fishing, the poop serves as a well-protected baithouse with convenient access to the bait hold. The vessel is designed so that it can be efficiently operated by the skipper and four crew members, but there are accommodations for eight should the necessity arise.

Simplicity is another keynote of design. Wherever possible, machinery has been kept to the same size to reduce the amount of spare parts required and all machinery is easily accessible for maintenance and overhaul. If an operator decides to install a minimum amount of gear on his boat initially there is assurance that space is available for future development. If more hold space is desired the length can be increased to 77 feet without changes to superstructure or machinery layout. Plans for deck and hold arrangements with profile sketches are included in the article. It is stated that this design is by no means the only possible solution to the problem, but it is hoped that provisions have been made for further developments when future vessel construction is considered.

2.8 THE EFFECT OF TIME AND TEMPERATURE OF COOKING ON THE PALATABILITY AND COOKING LOSSES OF FROZEN ATLANTIC CODFISH FILLETS

Armstrong, Iva L.; Park, Edna W.; and McLaren, Barbara A.; and Parker, Donne Sutherland
Journal of the Fisheries Research Board of Canada 17, 1-7 (January 1960)

Introduction.--Comparatively few reports of studies on the preparation of fish as a palatable food are to be found in the literature. Charley (1952) investigated the effects of oven temperature on the cooking losses and the palatability of baked salmon steaks, and Charley and Goertz (1958) extended this work by using larger pieces of salmon. Osterhaug and MacFarlane (1955) and Elgin et al. (1957) reported on the cooking of frozen halibut steaks. For the present study, frozen Atlantic cod fillets were chosen. Various thawing procedures were tested, and the effect of baking the fillets covered and uncovered and at low- and high-oven temperatures was evaluated.

Experimental procedure.--Commercial, frozen codfish fillets, which weighed proximately 1 pound and had been stored at 5° to 10° F., were used. Paired samples, A and B, of similar surface area and weight were obtained by cutting the fillet in half laterally after trimming off about ½ inch of its periphery. Sample A was placed on a piece of weighed aluminum foil on an aluminum baking sheet and cooked in a thermostatically controlled oven at 300° F. Sample B was treated similarly and baked at 500° F. To determine optimum doneness or ivory-white flesh with firm but tender moist flakes, paired samples were baked directly from the frozen state for various lengths of time. Baking for 70 minutes at 300° F. and for 25 minutes at 500° F. produced the desired characteristics. Thawed samples in contrast, required 60 minutes at 300° F. and 20 minutes at 500° F. according to the taste-panel scores.

Cooked samples were coded and scored for color, moistness, texture, tenderness, flavor, and

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 ABSTRACTER: Martin Heerdt

2.9 OCCURRENCE OF TETRAMINE AND CHOLINE COMPOUNDS IN THE SALIVARY GLAND OF A MARINE GASTROPOD, NEPTUNEA ARTHRITICA BERNARDI

Asano, Motokazu and Ito, Masao (Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 10, 209-227 (June 1959)

Introduction.--In a preceding paper, Osano (1952) studied food poisoning that was caused by the consumption of Neptunea arthritica and proved (1) that the poisonous substance is located only in the salivary gland and (2) that it is a nerve poison on the basis of the symptoms produced by it in animals.

In subsequent studies on the poisonous substance, Osano confirmed the occurrence of the tetramine and choline compounds in the salivary gland of this gastropod. This paper presents the results of experiments conducted by the authors with reference to food poisoning caused by the consumption of Neptunea arthritica.

Findings.--A poisonous substances in the salivary gland of Neptunea arthritica, was located by the application of paper chromatography, kymography, and intraperitoneal injection into mice. A Dragendorff-positive lethal component was found exclusively in the lysine fraction and identified as tetramethylammoniumhydroxide. Evidence for identification was obtained from melting points of the derivatives, infrared spectra, paper chromatographical behavior, and pharmacological antagonism tests.

l-Adrenaline reacted antagonistically to the poisonous substances and was most effective for prolonging the survival time after injection. Tetramethylammonium hydroxide, which was assayed quantitatively by paper chromatography, was found to be coexistent with choline and probably acetylcholine in the salivary gland of this gastropod.

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 ABSTRACTER: Martin Heerdt

2.9 EFFECT OF THE INGESTION OF TRIANOPHORUS PLEROCERCOIDS ON THE NUTRITIONAL CHARACTERISTICS OF WHITEFISH FILLETS IN THE RATIONS OF PUPPIES

Crampton, E. W. (Department of Nutrition, Macdonald College, McGill University, Quebec, Canada)
Journal of the Fisheries Research Board of Canada 17, 81-90 (January 1960)

Introduction.--Severe infestations of Triaenophorus crassus (tapeworm) in whitefish taken from certain fresh-water lakes and rivers in Manitoba have resulted in heavy losses to members of the fishing industry who attempted to place contaminated fish on the domestic or export market. Although Triaenophorus is not considered to be a parasite of man, the presence of these cysts renders the fillets unacceptable to the consumer on aesthetic grounds. There is also a possibility that the cysts may have some influence on the nutritive value of the fish other than to cause a simple reduction in palatability. The investigation reported here was undertaken to determine whether these cysts may, in fact, either render the fish toxic, or, to a lesser degree, exert enough of an adverse effect to disturb growth, appetite, or digestive and metabolic processes.

Young puppies were chosen as the experimental animals and were used in a series of three feeding trials wherein cyst concentration was varied from 0 to 30 per pound of fish, and in a toxicity trial wherein 80 cysts per pound of fish were fed. The effects of feeding cooked cysts, and of feeding the infected fish or uninfected fish + cyst mixture in combination with a dog meal, were also determined.

Findings.--To learn whether or not the ingestion of the cysts would affect the growth, the feed consumption, or the efficiency of feed utilization, 118 newly weaned puppies have been fed in 3- and 4-week trials on diets composed of meat or fish, with and without supplements of a meal mixture, to

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3.12 SODIUM ION, POTASSIUM ION, AND WEIGHT CHANGES IN FISH HELD IN REFRIGERATED SEA WATER AND OTHER SOLUTIONS

MacLeod, Robert A.; Jonas, R. E. E.; and McBride, J. R. (Fishery Technological Station, University, of British Columbia, Vancouver, B. C.)
Journal of Agricultural and Food Chemistry 8, 132-136 (March-April 1960)

Holding salmon and halibut in chilled sea water before processing is a growing practice in the fishing industry of the northeastern Pacific Ocean. Chilling units and reefer tanks have been installed on trollers, seiners, tenders, and packers, as well as in canneries in Canada and the United States, including Alaska.

In this paper the authors have recorded the changes in weight and in the concentration of sodium and potassium ions that take place in fish stored in refrigerated sea water. The effect of varying the salt concentration and osmotic pressure of the immersing solutions on the extent of these changes also was reported.

Results.--When sockeye salmon, halibut, herring, lemon sole, and brill were stored in refrigerated sea water for a week, analyses of the flesh revealed a rise in sodium ion and a drop in potassium ion over the natural levels. Weight increases in the fish ranging from 2.4 percent for salmon to 17.5 percent for a group of lemon sole were recorded after storage. The outer layer of the flesh of sockeye salmon showed a slow rise in sodium ion and a drop in potassium ion content over the first 48 hours of immersion in chilled sea water. After this period, more rapid changes in the flesh levels of these ions occurred. It was found that the weight changes of the fish could be prevented by adding 2 percent of polyvinylpyrrolidone to the immersing solutions.

See table, over.

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 ABSTRACTER: Kathryn L. Osterhaug

TIME AND TEMPERATURE OF COOKING

NUTRITIVE VALUE OF FILLETS HAVING TAPEWORMS

POISONOUS SHELLFISH

HOLDING FISH IN SEA WATER

2.9 (Cross Reference: 9.15)

which Triaenophorus crassus plerocercoids were added in amounts up to 80 cysts per pound of fish. The levels of pleorcercoids ranged from 0.39 to 66.0 per pup per day, which is equivalent to from 1.56 to 264.0 cysts per day for an average man consuming 3,000 dietary Calories in 24 hours. Although some tendency toward reduced feed efficiency for growth was observed at the maximum level of ingestion, probably caused by the low energy value of the diet (which in this case consisted almost entirely of the cystic material), no statistically significant effect of the T. crassus additions to the basal diets could be detected. It is concluded that fish fillets contaminated with T. crassus have no detrimental effect on the growth of puppies and presumably the accidental ingestion of such fillets by man would be of no consequence nutritionally.

3.12 (Cross Reference: 8.42)

Table 1.--Sodium and potassium ions and weight changes in sockeye salmon held whole and eviscerated in refrigerated sea water.

| Sea water container | Immersion time, weeks | Mg./100 g.[1] | | Weight increase[2] percent |
|---|---|---|---|---|
| | | Na+ | K+ | |
| Control (not immersed) | . . . | 33.5±1.1 | 411±15 | . . . |
| | | Whole fish | | |
| Full strength | 1 | 277±13 | 276±5 | 2.98±0.79 |
| | 2 | 422±18 | 198±6 | 4.33±1.25 |
| Half strength | 1 | 149±12 | 265±9 | 2.38±0.58 |
| | 2 | 221±20 | 201±17 | 3.45±0.65 |
| | | Eviscerated fish | | |
| Full strength | 1 | 297±38 | 272±19 | 4.63±1.39 |
| | 2 | 487±26 | 193±19 | 8.16±1.69 |
| Half strength | 1 | 178±29 | 257±34 | 3.89±0.99 |
| | 2 | 250±21 | 178±25 | 5.60±1.00 |

1/ Based on wet weight of muscle tissue. Each value represents average and average deviation of four fish.
2/ Of entire fish.

2.8

general acceptability by a panel of five judges who previously had been trained in tasting codfish. Each fillet was cooled to room temperature after removal from the oven and divided so that the presence of outside edges would not reveal the cooking procedure. Moisture in each pair of cooked samples was assayed according to the A.O.A.C. method (1955).

Loss of weight during cooking was due to evaporation of moisture and (2) the squeezing out of a moist, white coagulum which collected on the aluminum foil in the oven and was not served to the taste panel. In one phase of the experiment, paired samples were placed in sealed pliofilm bags and allowed to thaw under different conditions before being cooked. The liquid which accumulated during thawing was weighed and designated as thaw drip to distinguish it from the moist, white coaglum or oven drip.

Thawing procedures tested were (a) overnight at room temperature or 74° F., (b) 4 hours at room temperature, (c) 2 hours at room temperature plus 20 minutes on a rack over hot water at 179° F., (d) 24 hours at 50° F., (e) 50 minutes submerged in tap water at 79° F., and (f) 35 minutes submerged in hot water at 113° F. Paired samples defrosted by the method that proved most suitable were cooked at 300° F. and at 500° F. as follows: (a) uncovered or in aluminum foil left open, (b) covered or in aluminum foil wrapped tightly, and (c) covered for part of the time and uncovered for the remainder.

Results.--Thawing by submersion in tap water at 79° F. for 50 minutes resulted consistently in a more palatable cooked product. Thawing overnight at room temperature produced the least palatable cooked product. Thawing therefore, appears to be a very important step in the preparation of attractive cooked fish. Acceptability, moisture retention, and cooking loss of the cooked fish were not different regardless of whether cooking was carried out at 300° or 500° F. Samples that were uncovered at 300° F. and 500° F. were rated more attractive, more palatable, and better-flavored than those that were cooked covered. Suggestions are made for improving the wholesale and retail packaging of cod fillets.

2.9

Of the 12 related species of gastropods that were examined, Neptunea intersculpta, Fusitriton oregonensis, and Buccinum leucostoma, each had a similar poisonous substance in their salivary glands.

3.18 PLANT SANITATION IN FROZEN FOODS--A MANAGEMENT ATTITUDE

Emery, Albert W.
Quick Frozen Foods 22, 40-41, 156 (February 1960)

Bacteria are the enemies of product quality. Freezing does not banish bacteria, although it may reduce their number. When the product thaws, the bacteria resume their growth and multiply at a rapid rate. The only effective way to stop the ravages of bacteria is a sanitation program that is thoroughly planned and properly executed. At the planning stage, sanitation should always be considered as much a unit of processing as the freezing operation itself.

Mechanization of cleaning improves efficiency by increasing thoroughness, saving time, and cutting costs. Solutions can be sprayed under pressure into otherwise unaccessible areas. In mechanical cleaning, solutions can be used at higher temperatures than with hand cleaning, and heat improves the speed and efficiency of the cleaning process.

Several spray-cleaning devices are available. One that is frequently used in frozen food plants consists of a 50-gallon solution drum, motor, pump, hose, and application gun, all mounted on wheels so that it may easily be moved about the plant. Hot solution is made up in the drum and sprayed over all surfaces at the rate of about 2 gallons a minute up to 12,000 square feet in half an hour.

Line-pressure injector.--An even simpler device is a portable line-pressure injector which adapts the plant's own hot-water system to provide pressurized cleaning. It consists of a detergent r reservoir tank, Venturi unit, and control valves. Weighing about 40 pounds when filled with detergent, this portable device automatically mixes solution at the desired concentration, and delivers it in a jet spray.

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 ABSTRACTER: Kathryn L. Osterhaug

3.2382 THE ROLE OF ALUMINUM FOIL IN TEMPERATURE MODERATION OF FROZEN FOOD PACKAGES

Griffin, R. C., Jr. (Packaging Research Division, Reynolds Metals Co.)
Frosted Food Field 30, 34-36 (March 1960)

In order to study the thermal advantages of aluminum foil as a packaging material, several experiments concerning thawing rates of ice cream and frozen broccoli wrapped in plain and foil-laminated materials were conducted.

One experiment involved a comparison of retention qualities of 5-gallon bulk-ice-cream containers when wrapped in plain or in foil-laminated outer-shipping containers. It was found that the ice cream wrapped in foil and frozen at -22° F. had significantly lower temperatures during subsequent storage at 72° F.

In a second experiment, pints of ice cream wrapped in printed and unprinted foil were compared to control packages subjected to a radiant heat source provided above an open display freezer maintained at -9° F. to -15° F. The results of the experiment are presented in table 2 (see over). The results show that unprinted foil overwraps absorb less radiant heat than printed foil overwraps or plain cartons and that the foil-wrapped packages conduct this absorbed heat more rapidly to the lower layers of the freezer where it is dissipated.

In another experiment, packages of broccoli stalks wrapped in wax-paper overwrap and printed foil heat-sealing overwrap were subjected to freezer defrost and freezing cycles. The results of these tests are presented in tables 4 and 5 (see over).

These tests demonstrated that: (1) aluminum foil provides greater protection against radiant heat absorption or emission than do paper or paperboard material, (2) unprinted aluminum-foil overwraps absorb less radiant heat than do printed foil overwraps, and (3) printed aluminum-foil overwrapped packages of frozen foods maintain a colder temperature than do wax-paper overwrapped packages during periods of temperature fluctuation.

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 ABSTRACTER: Richard W. Nelson

3.238 PACKING OF FISHERY PRODUCTS

Peters, John A. (U. S. Bureau of Commercial Fisheries, East Boston, Massachusetts)
Fishing Gazette Annual Review Number 77, 144, 146, 148, 152, 154, 156 (1960)

Packages for fishery products must meet many requirements; one of the most important being the maximum protection of the product in order to maintain quality during storage and distribution. Many of the packaging materials that are now in use are not entirely adequate for this purpose.

In a study made at the Bureau of Commercial Fisheries Technological Laboratory in East Boston, Massachusetts, 178 samples of frozen haddock fillets were obtained from retail stores and examined. Indications of moderate dehydration were found on 7.3 percent of these samples. The haddock fillets had been packed in the usual one-piece waxed, fillet carton with a waxed-paper overwrap.

Studies at the same laboratory have demonstrated that the storage life of frozen shrimp can be extended at least 3 months by eliminating dehydration.

Packaging materials.--To eliminate dehydration during frozen storage it is necessary to use packaging materials that have very low moisture-vapor-transfer rates. Materials with this characteristic include polyethylene, polyester, and polyvinylidene chloride films. These products are finding increasing use in the packaging of fishery products. Combinations of various materials used either as laminates or as coatings also are used. These products may combine the favorable characteristics of each component and result in a packaging material with superior characteristics.

Very thin guage aluminum foil, 0.00035-inch thick, is too fragile to be handled by itself and is subject to numerous pinholes. However, when this foil is laminated to paper and the paper is coated

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 ABSTRACTER: Kathryn L. Osterhaug

3.2383 THE TECHNOLOGY OF BOIL-IN POUCHES

Doar, LeRoy H., Jr.
Frosted Food Field 30, 28-29, 40 (February 1960)

Boil-in-the-bag frozen foods are now attaining the status of full-fledged commercial products. The concept of boilable pouches extends back 20 years to when attempts were made to use cellophane as pouch material. The advent of some of the newer plastics revived the interest in boiling-pouches and their development has proceeded through the past 10 years.

In this article, the author discusses (1) the properties that are required in the pouch material, (2) the different kinds and types of material that are now available, and (3) the machinery employed in filling and handling boilable pouches.

Necessary properties.--The following is a list of properties that a packer must demand in material to be used in fabricating boilable pouches: (1) nontoxic according to Food and Drug Administration sanctions; (2) temperature operating range -40° F. to 212° F.; (3) low oxygen permeability rate; (4) low moisture permeability rate; (5) resistance to penetration of greases, oils, and flavor components; (6) the material itself should not impart off tastes or odors; (7) the material should be heat sealable; (8) the material should have strength to resist punctures, tears, and flexing.

Available materials.--The physical make-up of the container itself must be considered. Flexible packaging materials can be classified into these general groups: papers, films, and foils. All three of these are used in boilable pouches. The one material common to all boilable pouch stock currently in use is polyethylene of medium density. Density is a key to many of the basic properties of polyethylene and plays a major part in controlling those properties that have been listed as being vital.

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 ABSTRACTER: Kathryn L. Osterhaug

PLANT SANITATION

PACKAGING FROZEN FISH

ALUMINUM FOIL FOR FROZEN FOODS

BOIL-IN POUCHES FOR FROZEN FOODS

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with polyethylene, a wrapping material results that is easily printed, handles well on most packaging machines, and provides excellent protection to the wrapped product. Examples of other such combinations include coating polyester with various polymers to improve its heat-sealing characteristics, and combining cellophane with polyethylene to provide a packaging material with excellent gas transmission and high tensile strength. Shrinkable films, including polyester and polyvinylidene chloride, give a skin-tight fit around the product and provide excellent protection against dehydration.

Experimental materials that may prove useful in protecting fishery products include polypropylene film, which is superior to polyethylene in many characteristics including clarity, tensile strength, and gas permeability, and edible starch coatings that coat the product with a tough, tight-fitting film.

Packaging techniques.--In addition to needing protection from dehydration, fatty fish need protection against fat oxidation. Rancidity develops as the result of the reaction between the fat of the fish and the oxygen that is trapped in the package or migrates through the packaging material during frozen storage.

Various techniques are used in an attempt to solve this problem. One approach is through the use of vacuum packaging in shrinkable film bags from which the air is removed during packaging. Vacuum packaging in pouches or purging a package with nitrogen gas also removes the oxygen.

Another method of protection against rancidity consists of coating the unwrapped product with various materials including gels and solutions of corn syrup and corn syrup solids.

Oxidation is also prevented by the use of carton boards and wraps that contain autioxidants. This method is of particular value when there is close contact between the package and the product.

3.2383

Polyethylene, however, even in medium density, does not qualify as a boilable pouch material on its own. At a practical thickness, the film is not tough enough by itself to do the job. The most widely used product today is a lamination of medium-density polyethylene and polyester film.

Medium-density polyethylene laminated or coated to special papers also has produced commercially acceptable pouches. The properties of pouches made from these combinations may not be quite as desirable as the polyester-polyethylene combination, but for a wide variety of products they are completely satisfactory. These combinations of film and paper are the lowest cost products for boilable pouches available at present.

A third combination of materials in use today is the foil-polyethylene pouch. In this combination the foil is the primary material and the medium-density polyethylene is used mainly as a heat-sealing agent. To guard against puncturing the foil, manufacturers recently have included a layer of paper between the foil and the polyethylene film. Foil pouches generally require a longer time to complete the heating of the product than do the pouches made from the other materials.

Packaging machinery.--The major technological limitation to the rapid expansion of boilable pouches is the bottleneck in packaging machinery. Progress is being made in this field; however, and the situation is improving.

3.18

More difficult soils may call for more aggressive cleaning measures. In such cases, steam cleaning is recommended. Equipment available for this purpose includes those which develop their own steam, and others that use the steam supply of the plant. The latter are the simpler to operate and to maintain, particularly when they are of the solution-lifting design. They work on the Venturi principle: steam rushing through the nozzle of the gun creates a partial vacuum into which the premixed solution is drawn. The detergent solution and steam are mixed at the nozzle, and hit the soil with heat, force, and powerful detergent action. Rinsing is accomplished simply by turning a valve to cut off the flow of solution.

The selection of a mechanical cleaning method will depend on facilities in the plant, the nature of the equipment being cleaned, and particularly the type of soil. Obviously, wherever hand brushing or scrubbing can be eliminated, less work will be required.

Compounds for cleaning and sanitizing should be selected with as much care as cleaning methods. Most soils resulting from food processing operations may be removed by mildly alkaline detergents. A few soils that are heavy in protein or starch may require an acidic solution. The compound selected for cleaning should have certain properties. It should have good wetting-out ability; it should prevent the formation of insoluble soaps in hard water; it should have the ability to emulsify fats, keeping them in suspension and preventing redeposition on surfaces; it should rinse freely; and it should be safe on the equipment.

Stainless steel, galvanized steel, aluminum, and copper react differently to different cleaning compounds. Moderately alkaline materials may be used with complete safety on steel and copper, but they have a tendency to etch aluminum, tinned copper, and tinned steel surfaces. For these surfaces, detergents specially compounded with inhibitors are recommended. Harsh abrasives or steel wool should never be used on food-processing equipment because they may scratch or roughen the surface, giving bacteria new breeding grounds.

3.2382

Table 2.--Temperature of ice cream at equilibrium freezing cycle

| | Top | 2nd | 3rd | 4th | 5th | Top-bottom difference | Average |
|---|---|---|---|---|---|---|---|
| Unprinted Reyseal | -6.0 | -8.0 | -9.0 | -9.0 | -10.0 | 4.0 | -8.8 |
| Printed Reyseal | -0.8 | -7.0 | -10.0 | -8.0 | -7.0 | 6.2 | -6.5 |
| Colored foil laminated to paper | -1.0 | -7.0 | -8.0 | -8.0 | -7.0 | 6.0 | -6.2 |
| Average foil | -2.6 | -7.3 | -9.0 | -8.3 | -8.0 | 5.4 | -7.2 |
| Control (No overwrap) | +3.0 | -2.4 | -3.8 | -5.4 | -5.8 | 8.8 | -2.9 |
| Difference | 5.6 | 4.9 | 5.2 | 2.9 | 2.2 | | 4.3 |

Table 4.--Package temperatures during freezing cycles

| | Top | 2nd | 3rd | 4th | 5th | 6th | Top-bottom difference | Average |
|---|---|---|---|---|---|---|---|---|
| Foil overwrap | -12.2 | -12.2 | -12.8 | -10.8 | -15.2 | -17.2 | 5.0 | -13.5 |
| Paper overwrap | +0.2 | -9.8 | -10.0 | -10.0 | -12.0 | -14.5 | 9.6 | -9.4 |
| Difference | 12.4 | 2.4 | 2.8 | 0.8 | 3.2 | 3.0 | | 4.1 |

Table 5.--Package temperature during defrost (° F.)

| | Top | 2nd | 3rd | 4th | 5th | 6th | Top-bottom difference | Average |
|---|---|---|---|---|---|---|---|---|
| Foil overwrap | +16.0 | +6.4 | +5.6 | +5.2 | -0.6 | +7.0 | 9.0 | +6.8 |
| Paper overwrap | +24.6 | +10.8 | +9.6 | +5.6 | +2.0 | +9.2 | 15.4 | +10.3 |
| Difference | 8.6 | 4.4 | 4.0 | 0.4 | 1.4 | 2.2 | | 3.5 |

3.2495 BIOCHEMICAL CONDITION OF WHALEMEAT BEFORE OR AFTER FREEZING AND COLD STORAGE OF FROZEN MEAT

Tanaka, Kazuo and Tanaka, Takeo (Tokai Regional Fisheries Laboratory, Tokyo, Japan)
Journal of the Tokyo University of Fisheries 42, No. 1, 83-88 (1956) (Tokyo, Japan)

Frozen whalemeat yields an excessive amount of drip upon thawing. The reduction of drip and the preservation of quality are important problems in the handling of whalemeat. For this reason, the authors made an investigation into the origin of drip and into the changes in characteristics that take place in frozen whalemeat.

Observations on unfrozen whalemeat.--Three types of tissue have been observed in whalemeat: (1) contractile, (2) semicontractile, and (3) noncontractile. To investigate specific characteristics of unfrozen whalemeat, the authors followed changes in pH and weep value of a block of lean meat cut from the carcass of a fin whale just after capture in the Antarctic. The test block, which measured 7 cm. x 8 cm. x 15 cm. and weighed about 1 kg. was held in still air at +15°C. for 4 days. The results obtained are given in table 1.

Table 1.--Change in unfrozen whalemeat (at +15°C.)

| Time hours | 0 | 3 | 6 | 9 | 13 | 17 | 22 | 30 | 48 | 61 | 63 | 80 | 96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH | 6.85 | 6.45 | 6.30 | 6.20 | 6.00 | 5.80 | 5.70 | 5.60 | 5.50 | 5.40 | 5.30 | 5.38 | 5.74 |
| Weep percent | 0.0 | 0.0 | 1.0 | 2.9 | 7.2 | 10.5 | 13.4 | 14.6 | 15.5 | 15.9 | 16.0 | 16.0 | 16.0 |

The following observations were made: (1) At pH values above 6.2 the tissue was in a prerigor state. It was firm and dry to the touch with a bright blackish color. Little or no weep exuded from the meat. (2) At pH values between 6.2 and 5.8, the tissues were in progress of rigor and the meat was fairly hard and rubbery to the touch and reddish black in color. The weep value varied from 3 to

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 ABSTRACTER: Kathryn L. Osterhaug

3.4 DEPOSITION OF UNIPOLAR CHARGED AEROSOL PARTICLES BY MUTUAL REPULSION

Foster, W. W. (Torry Research Station, Aberdeen, Scotland)
British Journal of Applied Physics 10, 206-213 (May 1959)
Torry Memoir No. 11

During an investigation of the mechanisms of the deposition of wood smoke on surfaces, the author developed a method for increasing the rate of deposition by charging the particles with electricity of the same sign and allowing the particles to precipitate in their self-generated electric field. Although it is known that unipolar charged aerosols disperse rapidly, apparently little theoretical work, tested experimentally, has been published. Wilson derived equations for the deposition of a stationary charged cloud inside a tube, but these equations were not experimentally confirmed. Calculations have been given for the rate of deposition from a moving cloud onto a solid sphere under the influence of coulombic, induced, and space-charge forces and also onto plates. These calculations were experimentally tested.

The present study was concerned about deposition resulting purely from the mutual repulsion of charged particles in a moving cloud.

To test the theory he developed, the author found it convenient to use wood smoke, which contains homogeneous spherical tarry droplets formed when the smoke cools. Under the experimental conditions described in the report, the particles were apparently in equilibrium with the residual vapors. After deposition, they did not evaporate appreciably before being weighed.

To simplify analysis, the author assumed initially that wood smokes are monodisperse, the effects of polydispersity being discussed later.

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 ABSTRACTER: F. Bruce Sanford

3.338 RESEARCH ON THE RESISTANCE OF TINPLATE TO CORROSION

Britton, S. C. (The Tin Research Institute, Fraser Road, Greenford, Middlesex, England)
Chemistry and Industry No. 7, 158-163 (February 13, 1960)

Two major changes have been made in tin plate production. They are the introduction of a continuous cold reduction process for the manufacture of steel and the adoption of an electrolytic method for applying the tin coating. The steel is covered by a thin layer of $FeSn_2$, a layer of tin, a surface film of oxide, and a light cover of oil.

Oxide and oil layer.--The oil film acts as a lubricant in the handling of the sheets. The oxide film serves as a preservative against rust, and against the growth of air-formed films on the tin. In addition, the film prevents discoloration during the stoving of lacquers. The oxide films protect only against very mild corrosive conditions in the interiors of the cans. Sometimes tin plate is coated with lacquer. Failure of the lacquer to wet the metal surface may be caused either by an excessive quantity of fresh oil, or by aging changes in the oil. Lacquer adhesion tends to decline as the quality of the passivation increases.

Resistance to rusting.--The passivation treatment applied to electrolytic tin plate gives some protection against rusting but does not wholly compensate for a serious reduction in the thickness of the tin coating.

Interior corrosion of cans.--Discoloration or unwanted flavor in sealed food products can best be avoided by lacquering the internal surface of the can. The oxide films produced on electrolytic tin plate give some protection against staining, especially against the blue and black discoloration given by some sulfur-containing products.

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 ABSTRACTER: George Kudo

3.8 THE RIPENING PROCESS OF ANCHOVY

Anonymous
Redogörelse för Arbetsåret July 1, 1958-June 30, 1959. Svenska Institute for Konserveringsforskning, Göteborg, Sweden SIK Report No. 71, 36 (1959)

The studies of the influence of bacteria on the ripening of anchovies have been continued. By treatment of deheaded and degutted brislings in diluted formaldehyde solution, sterile fish were obtained. Salt, sugar, and spices are easily sterilized by dry heat at 150°C. Thus, in sterile preparations of anchovy the effect of extracts of the intestines, both before and after sterile-filtration, and the effect of inoculating with bacteria from anchovy could be studied. The formaldehyde treatment brings about changes in the proteins of the herring and conclusions have to be drawn very carefully; however, the experiments seem to confirm earlier indications that the intestines of the herring are of decisive importance in the ripening process.

Owing to the possibilities that $\gamma$-radiation could offer in this connection, some preliminary experiments were carried out. The experiments showed that by treatment of anchovy with 1.5 megarads, a sterile product could be obtained without any changes of the proteolytic activity of the intestines of the herring. In connection with this work, some studies on the proteolytic activity of sauces from anchovies also were carried out. It was found that these sauces also exhibit a certain amount of protein-decomposing activities.

The influence of sugar on the ripening process in anchovy as compare with the so-called fermented herring has been studied. The latter is made from Baltic herring without the addition of sugar. The process is a pure fermentation brought about by bacteria. The herring are degutted and packed, leaving some headspace, in wooden barrels. The salt concentration is about the same in

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 ABSTRACTER: Kathryn L. Osterhaug

DRIP FROM WHALEMEAT

CORROSION OF TIN PLATE

ELECTROSTATIC SMOKING

RIPENING ANCHOVIES

3.338

Internal corrosion of cans by acid products.--Tin is anodic to steel; corrosion of steel is inhibited by the presence of stannous ions; steels vary in their behavior; and both inhibitors and accelerators of corrosion occur in fruit juices. Lacquered cans sometimes have a shorter life than plain cans, because they have a restricted amount of free tin. For a large class of products, steel-base composition had little importance, but for other products, phosphorus or copper is injurious.

Effects of variability of can contents.--Products that are packed in cans may contain cathode depolarizers, inhibitors of the corrosion of tin or iron, and complexing agents for tin and iron. If plums are not heated sufficiently to destroy the enzymes in the stones, chemicals injurious to shelf-life are developed.

The corrosion processes inside cans.--The changes occurring in stored cans of fruit show characteristic behavior as follows: (1) For a long period, there is no appreciable hydrogen evolution in either plain or lacquered cans. (2) In a plain can, the tin dissolves from the outset at nearly constant speed, but little or no hydrogen is evolved until the iron starts to dissolve. (3) In a lacquered can, both tin and iron are slowly dissolved at first. When noticeable evolution of hydrogen begins, the iron-corrosion rate rises rapidly, but the tin dissolution rate remains the same. (4) The amount of hydrogen evolved in a can is proportional to the amount of iron dissolved.

Variation in the tin coating.--Electrolytic coatings are removed by some products at an appreciably faster rate than are hot dipped coatings. This could be an effect of coating grain-size, which is much smaller in the electrolytic coatings.

Variation in the alloy layer.--The tin-iron compound is cathodic to both tin and steel. Coupling with alloy increases the corrosion rate of tin but does not appreciably affect the corrosion rate of steel. The tin alloy on electrolytic tin plate provides a much less complete cover for the steel than does such a layer on hot-dipped tin plate. The shelf life is dependent on the total tin content of the coating and is independent of the alloy layer thickness.

3.8

both ripened and fermented herring. Studies of the microflora of fermented herring have shown that a Spirillum species that is abundant in these products undergoes strong morphological changes in media containing sugar. In ordinary media the bacteria are quite normal. The addition of sugar to anchovies could possibly prevent this type of fermentation in this product. Anchovies were therefore packed with and without sugar, with and without headspaces in the cans, and with and without the inoculation of bacteria from fermented herring. The results of the experiment showed that the typical smell of fermented herring was obtained only in cans that had been packed with headspace and inoculated. Sugar had no influence.

3.2495 (Cross Reference: 1.953)

10 percent. (3) As the pH value descended below 5.8, the rigor was resolved and a considerable amount of weep was exuded from the flesh. The meat was soft and wet to the touch and of a dull reddish color. As the pH reached 5.4 and lower the odor of the meat became progressively worse. The weep value at this point was about 16 percent.

Biochemical changes in frozen whalemeat.--Based upon the theory that the drip that is exuded when frozen meat is thawed is caused by the contraction of muscle tissues and by the liberation of water from muscle protein that has been denatured during cold storage, the authors followed the change in drip value in relation to the adenosine triphosphate level and the value of $\frac{\text{soluble protein N}}{\text{soluble total N}}$ of the meat. They used the first as the index of contractibility and the latter as a measure of the denaturation of protein.

Contractibility versus storage temperature.--Whalemeat of the contractile type stored at -8° C. showed a marked decrease in its ATP level and as its Δ 7 P-P content descended to 10 mg. percent the contractibility of the meat vanished. Whalemeat that was held at -16° and -24° C. retained its Δ 7 P-P content above 20 mg. percent even after 12 months' storage and its contractibility did not disappear.

Conclusion.--To obtain frozen whalemeat of biochemically superior quality that exudes only small amounts of drip on thawing and has a good taste, it is recommended that the meat be frozen at its early stage of post-rigor or in its prerigor state. The contractibility of the meat can be removed by keeping it in a room of moderate temperature for a short period just before defrosting. Recommended temperature and period of storage for the removal of contractibility are 5 days at -2° C. or 10 days at -3° C.

The storage temperature of frozen whalemeat should be as low as possible. As a practical standard, the allowable storage period at a given storage temperature may be taken as follows: up to 3 months' at -10° C., 6 months' at -15° C., and 12 months' at -20° C. of storage.

3.4

The principal topics considered in this article were (1) theory of space-charge deposition, (2) apparatus, (3) experimental, and (4) discussion.

Under "experimental" the subjects treated were (a) deposition of charged wood-smoke particles, (b) definition of V, velocity of smoke along cylinder, (c) reproducibility in duplication of experimental conductors, (d) effect of polarity and rate of charging on particle radius, and (e) effect on particle radius of aging before and after charging.

Under "discussion," the topics treated were (a) particle radius from the Lambert-Beer relationship, (b) calculation of the charge on wood-smoke particles, and (c) the velocity of charged particles in externally applied and self-generated fields.

In summary, then, the author has developed a simple theory of the deposition of unipolar charged aerosols by their mutual repulsion. This theory permits the average radius and the average charge of the particle to be determined from measurements of the mass of smoke deposited on metal surfaces and the charge given up by the particles. The method offers a means of determining the rate of coagulation of unipolar charged aerosols. Experiments with wood smoke indicate that the theory is correct. The calculated average radius of the smoke particles compares favorably with that determined from measurement of the optical density and mass concentration of the smoke. The charge determined by the method is consistent with that calculated on the basis of the corona-charging theory.

4.12A INFRARED SPECTROSCOPIC CHARACTERIZATION OF GLYCERIDES

Chapman, Dennis (Research Department, Unilever Ltd., Port Sunlight, Cheshire, England)
Journal of the American Oil Chemists' Society 37, 73-77 (February 1960)

The purpose of this report is to review the wealth of information present in the spectra of glycerides with particular attention given to crystalline configurations.

Triglycerides, diglycerides, and monoglycerides have been examined and their spectra are given. In table 1 (see below) is seen the frequencies of the main bands for long-chain triglycerides of the melt. These agree well with those obtained from solutions in chloroform. The spectrum of crystalline material will also include the major bands resulting from the functional groups present, but splitting of bands and shifts will occur. Furthermore, the spectrum of the crystalline material will usually be that of a single rotational isomer, as contrasted to a great many rotational isomers from the solution and liquid. In the latter, the bands are generally broad and smeared into one another.

Saturated triglycerides.--The spectra of saturated triglycerides vary according to the polymorphic form in which the glycerides occurs. The major differences between these spectra are similar to those shown by "even-acid" saturated triglycerides, such as tristearin. A single band occurs at 720 cm.$^{-1}$ for the $\alpha_L$-form; a doublet at 719 and 727 cm.$^{-1}$ for $\beta'/L$-form;

Table 1.

| Probable assignment | |
|---|---|
| C–H stretching ($CH_2$ and $CH_3$) | 3030-2967 cm.$^{-1}$ |
| C=O stretching (COOR) | 1751-1733 cm.$^{-1}$ |
| C–H bending ($CH_2/CH_3$) groups | 1464-1453 cm.$^{-1}$ |
| C–H bend (symmetrical deform of $CH_3$) | 1383-1361 cm.$^{-1}$ |
| C–H in plane wagging or rocking of $CH_2$ groups | 1261-1250 cm.$^{-1}$ |
| C–O stretching (COOR) | 1179-1166 cm.$^{-1}$ |
| $CH_2$ rocking mode | 730- 717 cm.$^{-1}$ |

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 ABSTRACTER: Edward H. Gruger, Jr.

4.12B INFRARED SPECTROSCOPIC CHARACTERIZATION OF GLYCERIDES

Chapman, Dennis (Research Department, Unilever Ltd., Port Sunlight, Cheshire, England)
Journal of the American Oil Chemists' Society 37, 73-77 (February 1960)

Unsaturated triglycerides.--Unsaturated triglycerides can be divided into two main types: those containing trans groups and those containing cis groups, although glycerides containing both of these groups also can occur. The trans group is clearly shown by a band at 963 cm.$^{-1}$. This band occurs in the spectrum of material in the liquid state, in solution, or in the crystalline state. (Author gives spectrum for two polymorphic forms of trielaidin.) The frequency of the main $CH_2$ rocking mode is at 722 cm.$^{-1}$ in the spectrum of the $\beta_L$-polymorphic form. The relative intensities of the bands in the 1250 cm.$^{-1}$ region change in a manner analogous to that observed with saturated triglycerides. A strong band at 896 cm.$^{-1}$ occurs in the spectrum of the $\beta_L$-form as in the spectra of saturated triglycerides. If a weak band occurs near 1660 cm.$^{-1}$ we may deduce that there is probably a cis group present.

It is preferable with these glycerides to obtain more than one spectrum if possible. Examination of the 1250 cm.$^{-1}$ region for the $\alpha_L$-form will give information about the chain length. The main $CH_2$ rocking vibration in the spectrum of the 2-oleo isomer is single at 717 cm.$^{-1}$, whereas that of the 1-oleo isomer is a doublet at 729 and 719 cm.$^{-1}$. The spectrum of the 2-oleo isomer also shows a strong band at 690 cm.$^{-1}$, attributed to the cis group. A strong band does not occur in this region of the spectrum of the 1-oleo isomer. A sub-$\alpha_L$ form showing a doublet at 719 and 727 cm.$^{-1}$ is also observed with these glycerides.

Unusual variations may occur when mixed crystal formation occurs. This is particularly observed with mixtures of 2-oleo and 1-oleo distearin. In the case of triolein, particular interest is shown in the band assigned to the main $CH_2$ rocking mode near 720 cm.$^{-1}$. In the spectrum of the $\alpha_L$-form the

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 ABSTRACTER: Edward H. Gruger, Jr.

4.13 BIOCHEMICAL STUDIES ON SOCKEYE SALMON DURING SPAWNING MIGRATION. IX. FAT, PROTEIN AND WATER IN THE MAJOR INTERNAL ORGANS AND CHOLESTEROL IN THE LIVER AND GONADS OF THE STANDARD FISH

Idler, D. R. and Bitners, I. (Fisheries Research Board of Canada, Technological Station, Vancouver, B. C.)
Journal of the Fisheries Research Board of Canada 17, 113-122 (January 1960)

Introduction.--In 1957, a pure race of Fraser River sockeye salmon was sampled (1) at Lummi Island, Washington before the fish entered the river, (2) at Lillooet 250 miles distant on the Fraser River in British Columbia, and (3) at the end of a 715-mile spawning migration to Forfar Creek, British Columbia. The term "standard" fish has been used in this series of investigations to denote an average fish of the pure race specified above.

Various organs and tissues undergo significant changes in weight during the spawning migration. The percentage composition and weight of an organ or tissue of the standard fish at any selected location permits the absolute quantity of a component to be calculated. The results are, within reasonable limits, those that could be expected if a fish could be assayed for proximate analysis, returned to the water, and recaptured further upstream for proximate analysis. Idler and Bitners (1959) have shown that the head, skin, bones, and tail contributed appreciably more fat energy than did the flesh during the river migration. Fat and protein energy contributed by the viscera, from the time the fish entered the river until death, was estimated at 2 to 4 percent of the total.

Purpose.--The present study was made to assess the relative contributions of the major internal organs to the total fat and protein consumption during the river phase of the spawning migration. Liver cholesterol was determined to correlate with values previously obtained for plasma from

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 ABSTRACTER: Martin Heerdt

4.91 MODIFICATION OF CHOLESTEROSIS AND LIPIDOSIS OF RATS MAINTAINED ON AN ATHEROGENIC DIET

Di Luzio, N. R.
Nature 185, 616-618 (February 27, 1960)

Introduction.--Although the liver is regarded as the primary organ of lipid metabolism, little is known of this metabolic process at the cellular level. The author attempted to clarify the participation of hepatic cells in lipid metabolism with studies on the lipid composition of isolated parenchymal and Kupffer cells. This work indicated that Kupffer cells probably are not involved in the uptake of plasma cholesterol, but that they do participate in its biotransformation or excretion.

Purpose.--The present work was designed to investigate the influence of reticuloendothelial hyperactivity on levels of liver cholesterol in rats maintained on normal and high cholesterol, high-fat diets. The reticuloendothelium was stimulated by the intravenous injection of a yeast extract, zymosan, in an amount of 10 mg. administered on alternate days.

Experimental.--Thirty-six male rats were used initially. Nine of these were normal rats that served as controls and received saline injections, nine were normal rats that received zymosan injections, nine were rats that received saline injections and were maintained on an atherogenic diet, and nine were rats that received zymosan injections and were maintained on an atherogenic diet. The atherogenic diet used in this study was similar to that employed by O'Neal et al. (1959). Daily records were kept on body weight and food intake. After 14 days, the study was terminated and the liver and spleen from the rats were assayed for ester cholesterol, free cholesterol, phospholipid fat, and neutral fat.

(over)

 ABSTRACTER: Martin Heerdt

4.12B

band is single at 723 cm.$^{-1}$, and for the $\beta'/L$-form it is split into two components at 729 and 722 cm.$^{-1}$, whereas the $\beta_L$-form shows a single band at 722 cm.$^{-1}$.

Diglycerides.--Diglycerides exist in two isomeric forms; namely, the 1:3 and 1:2 glycerides. Characterization of these two forms is usually quite simple, since the spectra of the crystalline forms differ considerably. The frequency of the bands in the 1250 cm.$^{-1}$ region are given below. Chain length can be deduced from the spectra in this region.

Monoglycerides.--Two isomeric forms of monoglycerides are possible, depending on where the chain is attached to the glycerol residue. The spectra of monoglycerides in the liquid state show that the bands are broad and tend to smear into one another. A means of differentiating the two types of monoglycerides follows from the fact that different thermal treatment of 1-monoglycerides gives rise to different spectra corresponding to their different polymorphic forms, whereas 2-monoglycerides exist only in one polymorphic form.

| Form | Saturated diglycerides | Frequency of bands in the 1250 region (cm.$^{-1}$) |
|---|---|---|
| $\beta_L$ | 1:3 dilaurin | 1328, 1310, 1298, 1266, 1235, 1211 |
| | 1:3 dimyristin | 1347, 1329, 1306, 1279, 1258, 1231, 1209 |
| | 1:3 dipalmitin | 1346, 1332, 1310, 1290, 1266, 1245, 1224, 1205 |
| | 1:3 distearin | 1340, 1328, 1309, 1292, 1271, 1255, 1231, 1214, 1198 |
| Form | Saturated glycerides | Frequency of bands in the 1250 region (cm.$^{-1}$) |
| $\alpha_L$ | 1:2 dilaurin | 1349, 1329, 1299, 1270, 1239, 1210 |
| | 1:2 dimyristin | 1347, 1333, 1306, 1281, 1259, 1231, 1205 |
| | 1:2 dipalmitin | 1343, 1331, 1308, 1286, 1265, 1240, 1221, 1199 |
| | 1:2 distearin | 1342, 1328, 1307, 1290, 1269, 1253, 1232, 1213, 1192 |

4.12A

and a single band at 717 cm.$^{-1}$ for the $\beta_L$-form. These correspond to the main rocking mode of the $CH_2$ groups. The sub-$\alpha_L$-form (obtained at -70° C.) has a doublet also at 719 and 727 cm.$^{-1}$.

The number of bands in the 1250 cm.$^{-1}$ region increases with increasing chain length. The number of bands for an even number of carbon atoms in the chain is usually equal to half the number of carbon atoms in the chain $\frac{1}{2}n$, whereas for an odd number of carbon atoms it is usually equal to half of the number of carbon atoms plus one $\frac{1}{2}(n+1)$. The frequencies of these bands are given in table 2. Although the number of bands in the spectrum of a triglyceride with an odd-numbered chain is the same as in the spectrum of the next higher even-numbered chain, all the bands are shifted in frequency.

To differentiate saturated triglycerides of mixed chain length is more difficult, since a number of complications may occur. With glycerides such as 1-palmito-distearin, the number of bands in the 1250 cm.$^{-1}$ region of the $\alpha_L$-form is the same as that in tristearin, whereas with 1-stearo-dipalmitin the number of bands is the same as in the spectrum of tripalmitin.

Table 2.

| Form | Saturated triglycerides | Frequency of bands in the 1250 region (cm.$^{-1}$) |
|---|---|---|
| $\alpha_L$ | Trimyristin | 1344, 1329, 1300, 1276, 1252, 1229, 1200 |
| | Tripalmitin | 1342, 1331, 1308, 1285, 1265, 1240, 1222, 1199 |
| | Trimargarin | 1334, 1318, 1299, 1276, 1260, 1235, 1219, 1198 |
| | Tristearin | 1341, 1330, 1308, 1289, 1270, 1255, 1232, 1216, 1193 |
| | Trinonadecylin | 1346, 1335, 1323, 1302, 1285, 1266, 1248, 1230, 1213, 1194 |
| | Tribehenin | 1339, 1323, 1310, 1293, 1279, 1265, 1252, 1233, 1222, 1205, 1189 |

(Continued on Card 4.12B)

4.91

Results.--In agreement with previous observations, the administration of zymosan to rats maintained on a diet of Purina chow significantly increased the weight of the liver and the spleen. Liver fractions of ester cholesterol and free cholesterol were not significantly altered in the normal rats that received zymosan. Maintenance of rats on the atherogenic diet for 14 days significantly elevated the free cholesterol and profoundly increased the ester cholesterol and the neutral fat. The administration of zymosan to rats maintained on the atherogenic diet induced a comparable increase in the weight of the liver and the spleen despite an elevated dietary liver of thiouracil. Zymosan significantly reduced the accumulation of free cholesterol, ester cholesterol, and neutral fat in the liver. No correlation could be demonstrated between changes in body weight and levels of cholesterol in the liver.

Dietary intake was significantly similar in the saline- and zymosan-treated groups that were maintained on the atherogenic diet. A significant reduction in the ester cholesterol of the plasma was also noted in the zymosan-treated group, although no change was observed in the concentration of the various lipid fractions of the spleen. To eliminate a question of body-weight alteration and to evaluate the effectiveness of zymosan in preventing liver cholesterol accumulation at a low level of dietary cholesterol, the author conducted a pair-feeding experiment over a 5-day period with 6 male rats maintained on Purina chow to which 1 percent cholesterol and 0.5 percent sodium cholate was added. These rats lost a mean of 9 percent of their initial weight. Untreated rats in the group that received cholesterol showed a significantly elevated concentration of ester cholesterol in the liver. In contrast, the ester cholesterol fraction of rats that were injected intravenously with zymosan in the amount of 5 mg. per day was reduced by 88 percent.

Conclusions.--A major determinant to elevated levels of cholesterol in the plasma and the liver of rats maintained on a high cholesterol diet appears to be the functional state of the reticuloendothelium and, specifically, the number and activity of the Kupffer cells.

4.13

flesh and blood (Idler and Tsuyuki 1958; Idler and Bitners 1958).

Methods and materials.--Twelve groups, each consisting of male and female sockeye and totalling 216 fish, were captured in such a manner as to eliminate struggle and stored at -30° C. in polyethylene bags (Idler and Tsuyuki 1958). Protein, water, and cholesterol were determined as previously described by Idler and Tsuyuki (1958) and by Idler and Bitners (1958). Fat (25 g.) from uncooked tissues was extracted for 16 to 18 hours with 200 ml. of methanol in a Soxhlet apparatus. The methanol was replaced with 200 ml. of chloroform and extraction was continued for 16 to 18 hours. The "oil" was concentrated nearly to dryness in a flash evaporator, and the residue taken up on chloroform-methanol (2:1); the nonfat contaminants were then removed as previously described by Folch et al. (1951).

Results and discussion.-- The major portion of the fat and protein was expended from the alimentary tract in the first 250 miles of the 715-mile journey. The fat and protein energy expended by the liver between Lummi Island and Forfar Creek was approximately 15 percent of that supplied by the alimentary tract. The energy content of the kidneys was essentially constant. The ovaries consumed 8 percent of the energy expended from the body of the standard female fish, whereas the testes accounted for only 0.5 percent of the energy expended from the body of the standard male between Lummi Island and Forfar Creek.

The percentage of water in all major internal organs increased between Lummi Island and Forfar Creek. The smallest change in water on a percentage basis occurred in the testes. It previously had been shown that the total cholesterol level of the plasma in the female was seven times as high at Lillooet as at Forfar Creek. It is now apparent that no significant change in the concentration of total cholesterol in the liver takes place between these two locations, although a 12.5 percent decrease in cholesterol in the liver of the standard female did occur.

6.195 BIOLOGICAL EVALUATION OF FACTORS AFFECTING THE PROTEIN QUALITY OF FISH MEALS

Rand, N. T.; Collins, V. K.; Varner, D. S.; and Mosser, J. D.
Poultry Science 39, 45-53 (January 1960)

The authors studied a short-term bioassay to assist in controlling effects of processing procedure on nutritive value of manufactured fish products and to develop a quality-control system that could be used as a routine laboratory test.

Experimental.--A chick bioassay method was used that was a modification of a method described by Hinners and Scott (Poultry Science 36, 1126 (1957)). The diets contained suboptimal levels of protein, usually 10 percent. Three reference protein standards were used: (1) protein-free, (2) Drackett assay Protein C-1, and (3) a laboratory-prepared defatted fish meal made by the VioBin azeotropic process. The protein-free diet was assigned a value of 0, the Drackett soy protein was given an arbitrary value of 100, and the VioBin fish meal was found to have a value of 135. The protein value of unknown samples was then determined by interpolation.

Results and discussion.--Results of analyses of 70 commercial fish meals were as follows: (see table 1, over).

Results of analyses of defatted meals prepared in the laboratory by the VioBin azeotropic process from 11 species of whole fish were as follows: (see table 2, over).

Meals made from fish muscle only had a higher protein quality than meals made from whole fish (140 as compared with 135). The value of defatted meals from fish gurry was relative to the proportion of fish flesh and to the protein present in the gurry. Tests were made on the effect of fat extraction on the protein quality of commercial fish meals. Defatting meals of fair protein quality

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ABSTRACTER: Neva L. Karrick

7.593 THE SEPARATION AND DETERMINATION OF FREE PURINES, PYRIMIDINES AND NUCLEOSIDE IN COD MUSCLE

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
The Analyst 85, 111-115 (February 1960)

Introduction.--The nitrogenous extractives and volatile substances in fish muscle are major flavoring constituents that have been used to provide objective indexes of the freshness of fish. In 1959, Saito, Arai, and Matsuyoshi measured the degradation of adenine nucleotide (freshness) and evaluated a combined fraction of hypoxanthine and inosine that was separated chromatographically from nucleotides. In the author's experience, the determination of hypoxanthine alone has been of greater value than the simpler combined measurement. The presence or absence of other purines has been found to give an indication of the physiological condition of the fish before death. A satisfactory and reasonably rapid procedure for complete analysis was therefore required.

Chromatography appeared to be the most suitable method of analysis. Cohn (1949) reported separations of synthetic mixtures of purines and pyrimidines and of mixtures of ribonucleosides on anion-exchange resins. Saito and Arai (1958) separated a crude fraction containing both hypoxanthine and inosine from extracts of carp muscle by stepwise elution from a similar resin system.

Purpose.--This paper describes separations of hypoxanthine from other purines and pyrimidines and inosine (hypoxanthine riboside) by a rapid system of gradient elution from an anion-exchange resin. Interfering nucleotides are removed in a preliminary operation.

Method of extraction.--Dissect 6 to 10 g. of muscle, and homogenize into two volumes of chilled 0.6 N perchloric acid. Filter the mixture rapidly at 0° C. and immediately adjust the pH of the filtrate to 6.5 by carefully adding 5 N potassium hydroxide. Do not allow the pH to rise above this

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ABSTRACTER: Martin Heerdt

7.51 THE SEPARATION OF LIVER PROTEINS BY ELECTROPHORESIS ON AGAR

Voskoboinikov, G. V. (Biochemical Division, Central Research Institute for Roentgenology and Radiology, Ministry of Public Health, U.S.S.R., Leningrad)
Biochemistry (U.S.S.R.) 24, 377-381 (May-June 1959)

Experimental.--The method used for the preparation of the agar gel and the design of the electrophoresis apparatus were similar in principle to the method and design described by Grabar (Biokhimiya 22, 49 (1955)).

Extracts of proteins were prepared from mouse livers by homogenization with saline or water. Lipid was removed from the extract by treatment with ether. Some extracts were heated to 37° and 80° C.

Aliquots of 0.01 to 0.04 ml. of protein solution were placed on filter paper and the papers placed in grooves on the agar. Electrophoresis lasted from 3 to 7 hours at 70 to 75 v. and a current strength of 25 to 30 mA.

The components on the electrophoretogram were detected by treatment with a 0.02 percent solution of aniline blue in 10 percent acetic acid for 24 hours. This was followed by treatment with a 0.02 percent solution of analine blue in 10 percent trichloroacetic acid and by washing in 5 percent acetic acid 2 to 3 times and in water 3 to 4 times.

Results.--The liver extracts were fractionated in 13 separate fractions. No differences were found in the protein composition when saline extracts were compared to water extracts. The same

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ABSTRACTER: Herman S. Groninger

7.63 OCCURRENCE OF RIBOFLAVIN IN STURGEON SKIN

Courts, A. (British Gelatine and Glue Research Association, London, N. 7, England)
Nature 185, 463-464 (February 13, 1960)

Introduction.--Loomeifer (1958) has reported the presence of a yellow fluorescent pigment in elastin and has commented upon the views of Szent-Györgyi (1959) on the function of riboflavin-5-phosphate as an energy transmitter in metabolism. Blair and Graham (1954) found riboflavin to be present in the skin of green snakes. These reports of fluorescent materials associated with connective tissues, which are metabolically relatively inert, prompted this note on the occurrence of riboflavin in sturgeon skin. These observations form part of a survey on nonteleostean fish collagen.

Experimental.--The skin of a young (7 kgm.) sturgeon (Acipenser sturio) was mechanically freed from muscle and scales and heated in the dark for 3 hours in 60° C. water that had been adjusted with acetic acid to pH 4.5. Approximately 80 percent of the collagen was converted into gelatin, which, as a 5.6 percent (w/v) solution, gave the physical properties shown in the table (see over), and compared with gelatins from isinglass (Acipenser huso huso), shark skin (Selachus maximus) and cod swim-bladder (Gadus morrhua) prepared under similar conditions.

Results.--The gelatin solution from the sturgeon skin was unusual in that it was associated with a yellow pigment that had a strong green fluorescence. The fluorescence was destroyed by sunlight. The absorption spectrum of this gelatin, plotted between 380 and 580 mμ, was found to be similar to that for an acid-processed pig skin gelatin to which riboflavin had been added.

In addition, when the sturgeon skin gelatin was irradiated with an ultraviolet source for 30 minutes and the absorption curve plotted, it was found that the hump had been removed. The plot of the differences in absorption between the irradiated and nonirradiated forms

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PROTEIN QUALITY OF FISH MEAL

ELECTROPHORETIC SEPARATION OF PROTEINS

ASSAY FOR PURINE, PYRIMIDINE AND NUCLEOSIDES

RIBOFLAVIN IN STURGEON SKIN

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results were obtained for unheated extracts and extracts heated to 37° C.; however, only 8 components were found in the extracts heated to 80° C.

The aniline blue was eluted from the gel with ethanol and analyzed spectrophotometrically. It was shown that by using crystalline ferritin over a definite range the spectral absorption was proportional to the amount of protein in the fraction.

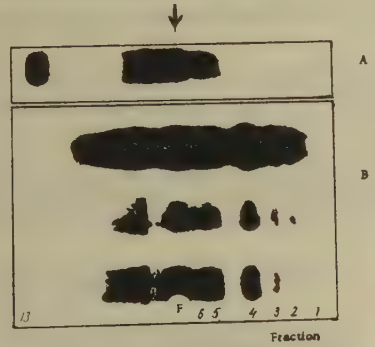


Figure 2.--Electrophoretogram of liver proteins. Duration of electrophoresis: A) 3 hours; B) 7 hours; ↓) place of introducing sample.

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shows a maximum at approximately 455 mμ, which corresponds to the maximum given by riboflavin. It seems likely, therefore, that riboflavin is the color component of this sturgeon gelatin.

Conclusions.--It remains to be seen whether the presence of riboflavin in sturgeon skin is a pigmentation phenomenon or whether it is a metabolic factor involved in the laying down of collagen in a young animal.

Table 1.--Properties of fish gelatins

| | Gelatin 5.6 percent (w/v) | |
|---|---|---|
| | rigidity dynes/cm.$^2$ at 10° C. | viscosity cp. at 40° C. |
| Sturgeon skin | 25,000 | 5.2 |
| Isinglass | 60,000 | 5.8 |
| Shark skin | 45,000 | 4.3 |
| Cod swim-bladder | c. 100 | 4.0 |

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apparently had no effect, but the extraction of fat from poor and very poor meals appreciably increased their average protein quality from 52 to 97. Chemical studies on the oils extracted with petroleum ether from the poor meals indicated that they were oxidatively polymerized. Affects of storage were also checked. Defatted meals maintained their original protein quality, and four of the seven fat-containing meals decreased significantly in their protein quality during storage.

Table 1.--Protein quality of commercial fish meals

| Protein quality | | Number of meals | Percent |
|---|---|---|---|
| Excellent | (135-140) | 5 | 7 |
| Very good | (130-135) | 8 | 11 |
| Good | (120-130) | 18 | 26 |
| Fair | (110-120) | 19 | 27 |
| Fairly poor | (100-110) | 9 | 13 |
| Poor | ( 80-100) | 7 | 10 |
| Very poor | ( 0- 80) | 4 | 6 |
| Range | 30 to 140 | | |
| Mean | 117 | | |
| Median | 118 | | |

Table 2.--Effect of species on protein quality of fish meals (Laboratory meals by the VioBin Azeotropic Process)

| No. | Fish species (whole fish) | Protein quality | No. assays |
|---|---|---|---|
| 1 | Butterfish (Poronotus triacanthus) | 130-139 | 6 |
| 2 | Haddock (Melanogrammus aeglefinus) | 132-136 | 2 |
| 3 | Menhaden (Brevoortia tyrannus) | 130-136 | 5 |
| 4 | Sheepshead (Archosargus probatocephalus) | 132-138 | 12 |
| 5 | Whiting (Merluccius bilinearis) | 133-141 | 4 |
| 6 | Yellow tail (Limanda ferruginea) | 131-137 | 4 |
| 7 | Mackerel (Scomber scombrus) | 130-134 | 3 |
| 8 | Hake (Urophycis chuss) | 130-132 | 2 |
| 9 | Eelpout (Macrozoarces americanus) | 133-140 | 8 |
| 10 | Dogfish (Squalus acanthias) | 120-128* | 3 |
| 11 | Skate (Raja ocellata) | 120-125* | 3 |

*Protein quality for dogfish and skate was 133 to 137 when urea nitrogen was discounted.

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value, or the nucleotides may break down. After 30 minutes at 0° C., remove any potassium perchlorate that has crystallized.

Removal of nucleotides.--Run an aliquot equivalent to 5 g. of tissue through a column containing the formate form of Dowex 1. Wash with water until the optical density of the effluent has decreased to 0.01 at 260 mμ. The effluent and washings contain the nucleoside, purine, and pyrimidine fractions.

Separation of purines, pyrimidines, and nucleosides.--Adjust the combined effluent and washings from the column containing the formate form of Dowex 1 to between pH 11 and 12 with 2 N ammonium hydroxide, and pass them through a column containing the chloride form of Dowex 1. Wash with water containing two drops of 2 N ammonium hydroxide per 50 ml. until the optical density of the effluent has decreased to 0.01 at 260 mμ. Attach the column to the separation assembly and, with the polythene connection closed, pour 200 ml. of a solution of 0.2 N ammonium hydroxide containing 0.02 N hydrochloric acid into the mixing vessel. Attach the reservoir to the separation assembly, fill it with the solution of 0.05 N hydrochloric acid containing 0.01 M sodium tetraborate, and stir this solution mechanically. Open the reservoir stopcock and the polythene connection. By means of the screw clip on the side arm of the column, release sufficient air to break the air lock between the column and the mixing vessel. Open the column stopcock and start the collector. Collect ninety 5-ml. fractions over a period of 2 to 16 hours. Measure the optical densities of these fractions with a recording spectrophotometer at 260 mμ to establish the positions of the peaks of maximum optical density and combine the fractions that show the same individual peaks. Add hydrochloric acid, bring the combined fractions to a concentration of 2 N, and make optical density measurements at the appropriate absorption maxima for evaluation against known molar extinction coefficients. The combination of fractions allows the dilution of large peaks to a concentration at which Beer's law applies.

7.6133 ESTIMATION OF THE BIOLOGICAL POTENCY OF VITAMIN A SOURCES FROM THEIR MALEIC VALUES

Ames, Stanley R. and Lehman, Robert W. (Distillation Products Industries, Division of Eastman Kodak Co., Rochester, New York)
Journal of the Association of Official Agricultural Chemists 43, 21-25 (February 1960)

Introduction.--Vitamin A concentrates used for feed supplementation often contain a number of geometric isomers of vitamin A. The four isomers of commercial importance are all-trans; 6-mono-cis; 2-mono-cis (neo); and 2,6-di-cis vitamin A. In each of these, cis-trans isomerization occurs about the 2 to 3 or 6 to 7 double bonds.

Chemical assays for biological potency such as the antimony trichloride blue-color assay procedure or the spectrophotometric assay procedure give erroneously high results if 6-mono-cis and 2,6-di-cis isomers of vitamin A are present in the concentrate. Lehman et al. and Ames et al. found that the 6-cis-isomers can be formed during the isomerization of all-trans-vitamin A in aqueous multivitamin dispersions. Brown et al. (1959) found that substantial amounts of isomers of low biological potency are present in naturally occurring fish-liver oils. These findings emphasize the need for new analytical procedures.

Methods for identification of geometric isomers of vitamin A.--Several procedures exist for estimating the isomeric composition of mixed vitamin-A isomers. The formation of a visual pigment, rhodopsin, by in vitro reaction of the retinal protein, opsin, with 4-mono-cis-vitamin A aldehyde has been used by Hubbard (1956). The reaction of 6-mono-cis-vitamin-A aldehyde with opsin to form isorhodopsin, which differs from rhodopsin in its ultraviolet absorption spectrum, has been used by Brown et al. (1959) as an assay for the 6-mono-cis and 2,6-di-cis isomers of vitamin A. At present, the opsin assay, which can give valuable information about the isomeric composition of a source of vitamin A, must be regarded only as a research tool.

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 ABSTRACTER: Martin Heerdt

8.42 SODIUM CONTENT OF FISH FLESH

Thurston, Claude E. and Osterhaug, Kathryn L. (U. S. Bureau of Commercial Fisheries, Seattle 2, Washington)
Journal of the American Dietetic Association 36, 212-215 (March 1960)

Early reports concerning the sodium content of foods, including fish, were misleading because the available data were based on too small a number of samples. This report presents data on the sodium content of fish flesh that are based on adequate sampling and that take into account various factors that might cause the sodium content to vary.

The data, which are reported here in tabular form, reflect a wide variation in sodium content between the different species and also between fish of a single species. Other factors that influence the sodium content of fish flesh include sex, size, and season of capture. These variations are not sufficiently large, however, to prevent the use of fish-flesh in sodium-restricted diets.

Effect of handling on sodium in fish.--The dietitian is more concerned about the sodium content of the fish as it is eaten than in the amount of sodium it contained at any prior time. It therefore is important to consider the effect of handling methods on sodium content.

Fish is subject to three types of handling before it reaches the patient: (a) on board the fishing vessel, (b) in the processing plant, and (c) during cooking. Sodium may either be gained or lost during these three stages of handling.

Fish fillets and steaks to be frozen usually are dipped in water, in a preservative solution, or in dilute brine before packaging. When only fresh water is used, there is little change in the sodium content of the flesh, but when brine or other solutions are used, the sodium content may be increased several fold. Since large quantities of fish are readily available that have not been treated by sodium-containing compounds, the high sodium values for the treated products do not preclude the use of fish in sodium-restricted diets.

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 ABSTRACTER: Kathryn L. Osterhaug

8.42 BIOCHEMICAL STUDIES ON PEARL. VIII. OCCURRENCE OF CALCITE, ARAGONITE AND DOLOMITE IN PEARL AND SHELL

Tanaka, Shozo; Hatano, Hiroyuki; and Itasaka, Osamu (Kyoto University, Sokyo-ku, Kyoto, Japan)
Bulletin of the Chemical Society of Japan 33, 182-195 (February 1960)

Introduction.--Several analytical results on the pearl and the shell materials of the pearl oyster have been reported, but few observations have been made on the nature of the chemical constituents either of the pearl or the shell. This paper reports a study made of the chemical compositions of the nacre of pearl, that is, the nacreous portion of the shell or "mother-of-pearl," which forms both the innermost layer of the shell and the prismatic substance of the outer layer of the shell.

Materials.--Cultured pearls from 3-year-old Japanese pearl oysters were separated mechanically into nacres and nuclei, the latter being put aside. Outer layers of shell were scraped off a grinding wheel, and a nacreous substance was prepared from the inner layers of the shells. A prismatic substance from the outer layers was obtained mechanically from thin, posterior shell margins. These materials were crushed in a porcelain mortar, dried at room temperature for a few days, and pulverized. Calcium carbonate crystals for X-ray diffraction analysis were prepared from the pearls and the shell substances by immersing the pulverized materials, in 1-percent solutions of sodium hypochlorite for a few hours to remove organic substances.

Methods.--Moisture was determined by measuring the decrease in weight that resulted from drying at 105° C. for 24 hours; total nitrogen was determined by a semimicro-Kjeldahl technique; total ash was determined by igniting a sample of material to a constant weight at approximately 700° C. and making a correction for the ignition loss of carbonate. Inorganic constituents in the ash were determined as follows: phosphate as ammonium phosphomolybdate, calcium as oxalate, sulfate as barium sulfate, and magnesium as ammonium magnesium phosphate after being separated from calcium. The carbonate content was calculated from the amount of carbon dioxide found by

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 ABSTRACTER: Martin Heerdt

8.7 GOVERNMENT PRESENTS PROVISIONAL STANDARDS FOR GRADES OF FROZEN RAW HEADLESS SHRIMP

Anonymous
Quick Frozen Foods 22, 257-258, 260 (March 1960)

The U. S. Government will inspect frozen raw headless shrimp!

A new code of U. S. Standards for Grades of Frozen Raw Headless Shrimp, recently released in provisional form, can have a beneficial influence on the troubled domestic shrimp industry.

The code, promulgated by the U. S. Department of the Interior, Fish and Wildlife Service, if accepted by the many domestic shrimp producers, will give the industry a basis upon which to build standards of quality that will represent faithfully the steps or differences in market value.

Just what effect the new shrimp standards will have upon the industry is open to conjecture. More than just a quality rating of U. S.-produced frozen raw shrimp is involved.

Since only U. S. shrimp will be inspected and graded by the Government, domestic producers will have the benefit of selling their product with the U. S. Grade A stamp, the seal of top quality. Because of the large quantity of shrimp imported into this country and the problem inherent to this, some industry people may consider this new program highly advantageous in promoting domestic products. Consider the fact that between January and October, 1958, shrimp imports totaled 85,675,000 pounds, which came close to the 98,692,000 pounds produced in this country from January to November, 1958.

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ASSAY OF VITAMIN A ISOMERS

SODIUM CONTENT OF FISH

CALCITE, ARAGONITE, AND DOLOMITE IN PEARLS AND SHELL

STANDARDS FOR FROZEN SHRIMP

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Table 2.--Sodium content of raw flesh of fresh-water fish and salt-water fish from the Atlantic and Pacific (5)

| Fresh-water fish | | Atlantic salt-water fish | | Pacific salt-water fish | |
|---|---|---|---|---|---|
| Species | Sodium | Species | Sodium | Species | Sodium |
| | mg./100 gm. | | mg./100 gm. | | mg./100 gm. |
| Carp | 48 | Pollock | 48 | Albacore | 34 |
| Yellow pike | 50 | Mackerel | 48 | Halibut | 53 |
| Whitefish | 51 | Flounder | 56 | Lingcod | 62 |
| Buffalo fish | 55 | Sea trout | 59 | Gray cod | 76 |
| Herring | 56 | Haddock | 61 | Yellowtail rockfish | 50 |
| Mullet | 59 | Porgy | 63 | Red rockfish | 66 |
| Sheepshead (river) | 59 | Whiting | 65 | Black rockfish | 66 |
| Yellow perch | 69 | Sea Bass | 70 | Orange rockfish | 71 |
| Sheepshead (lake) | 77 | Red snapper | 70 | Ocean perch | 79 |
| Average | 58 | Mullet | 81 | English sole | 91 |
| | | Average | 62 | Petrale sole | 96 |
| | | | | Average | 68 |

Table 6.--Variations in sodium due to preservation

| Species | Sodium | | | |
|---|---|---|---|---|
| | Dry frozen | Iced | Fresh | Brine chilled |
| | mg./100 gm. | mg./100 gm. | mg./100 gm. | mg./100 gm. |
| Halibut | 58 | 51 | -- | -- |
| Flathead sole | 85 | 60 | -- | -- |
| Pink salmon | -- | -- | 59 | 520 |
| Yellowfin tuna | -- | -- | 37 | 439 |

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The Department of Interior estimates the 1959 shrimp imports to be 99,652,000 pounds, not far behind the domestic catch. Although no complete figures are available on domestic shrimp production for last year, the Department of Interior does indicate a figure of 107,881,000 pounds produced here between January and November in just the Gulf Coast States alone, which is responsible for the majority of this country's shrimp supply. Domestic shrimp, advertised and so marketed with the Grade A stamp, a sure proof of quality recognized by the consumer as well as the trade, can very well influence the national sale of shrimp right down the line. The standards, according to the Department of Interior, are designed to serve as a convenient basis for sale in wholesale transactions and as a basis for establishing quality control programs. They will also serve as a basis for the inspection of shrimp by the Federal Inspection Service, similar to the inspection on breaded shrimp, fish sticks, and fillets. It is felt that the code will bring about a uniform quality description in simple, easily understood terms upon which satisfactory trading can be effected.

Grade A is specified as the quality of frozen raw headless shrimp of a single size that possess a good flavor and odor and, on a scoring system outlined, receive a score of not less than 90 points.

Grade B is the quality of a single size of shrimp that possess at least reasonably good flavor and odor and receive a score of not less than 80 points.

Grade C is the quality of a single size of shrimp that possess at least reasonably good flavor and odor and score not less than 70 points on the rating. Substandard is defined as the quality of frozen raw headless shrimp that fail to meet the requirements of Grade C.

Although the average weight and number of shrimp per pound are not factors of quality in determining the grade of the product, the code will consider the degree of conformity of the weights of the individual shrimp to the average weight in the sample since it is a factor affecting the utility of the product. The Department of Interior points out in the Standards that compliance with the provisions of the code shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act.

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Brown et al. (1959) has described the application of small but distinct differences in the infrared absorption spectra of vitamin -A isomers to elucidate the composition of purified mixtures of isomers of vitamin-A aldehyde. Infrared analysis, however, has no practical application to vitamin -A samples of low biopotency, such as those commonly found in vitamin A sources that are used for feed supplementation.

Relationship of biological potency and maleic value.--Ames et al. have recently found that the relative biological potencies on a blue-color basis and maleic values (MV) of various synthetic and natural isomer mixtures of vitamin A palmitate are related by the following cubic regression equation: relative biopotency = $99.5 - 0.2\,(MV) - 0.051\,(MV)^2 - 0.000768\,(MV)^3$.

To obtain the maleic value, which characterizes those isomers in which both the 2 to 3 and 4 to 5 double bonds are trans, vitamin A is reacted with maleic anhydride for 16 hours; and the maleic value is calculated from the proportion of unreacted vitamin A.

Method.--To obtain the biological potency of a source of vitamin A by simple chemical measurements, the sample is saponified and its antimony trichloride blue-color potency and maleic values are determined. Relative biopotency is determined from the maleic value with the aid of the cubic regression equation for use as a correction factor for the presence of isomers that are lower in biopotency than all-trans-vitamin A. The estimated biopotency of the vitamin A source is the product of the blue-color potency and the relative biopotency correction factor.

Application of procedure.--Relative biopotencies of samples of vitamin A mixtures were estimated from observed maleic values by the use of the cubic regression equation. The same sources of vitamin A were bioassayed by chick diet-supplementation liver-storage procedures. Biopotencies that were estimated from chemical measurements agreed well with biopotencies estimated from chick assays.

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Conway's microdiffusion method.

Conchiolin was estimated from the amount of residue remaining after the inorganic constituents were dissolved in dilute hydrochloric acid. X-ray diffraction patterns of crystalline calcium carbonate in the pearl and the shell were recorded by the Norelco X-ray diffractometer. The state of chemical combination of a minute amount of magnesium, which was found in the pearl as well as the shell, was determined by the chemical method established by Kitano (1956).

Results and discussion.--The pearl as well as the shell contain about 90 percent of calcium carbonate and a few percent of conchiolin. Only minute amounts of phosphate and sulfate were found in the pearl and the shell of the pearl oyster. Less conchiolin and a larger amount of calcium carbonate were found in the nacre than in the prismatic substance. Scant amounts of pigment are present in the pearl and the nacreous shell, whereas substantial amounts of coloring substances can be found in prismatic substances. In comparison with the nacre, relatively large amounts of mangesium are contained in the prismatic layer of the shell.

Crystals of calcium carbonate existing in the nacre of pearl and in the nacreous layer of shell were identified as aragonite crystals of a rhombohedral lattice, whereas those in the prismatic layer were identified as calcite crystals of a rhombic lattice. Special conditions required for the growth of aragonite instead of calcite crystals include a higher pH value and higher temperature of the surrounding media as well as an immediate supply of materials to support rapid crystal growth. The presence of relatively large amounts of magnesium ion appears to favor the formation of aragonite crystals. Magnesium exists as dolomite in the nacre of pearls and in the nacreous layer of shells and as a solid solution of calcite and dolomite in the prismatic layer.

8.59 OBSERVATIONS ON THE BEHAVIOR OF MEAT PIGMENTS IN SOLUTIONS

Glidden, Mina; Mangel, Margaret; Singleton, Katya; and Stone, Miriam (University of Missouri, Columbia)
Food Research 25, 127-138 (January-February 1960)

Introduction.--A major problem in food technology is the development of reliable objective tests that will indicate changes in foods before deterioration is recognizable by organoleptic means. In meats, particularly beef, changes in acceptability are accompanied by a brown discoloration. The color change is attributed to the conversion of the bright red pigment, oxymyoglobin, to the intermediary dark purple pigment, reduced myoglobin, and then to the brown pigment, metmyoglobin. The reduced myoglobin pigment is found in negligible amount on meat surfaces or in pigment solution since it is readily oxygenated to oxymyoglobin or oxidized to metmyoglobin.

Early work in the author's laboratory included a study of the behavior of meat pigment extracts and the possibility of developing an objective color test for detecting meat deterioration. The spectrophotometric method of Austin and Drabkin (1935-36) modified by Jensen and Urbain (1936), which is routinely employed in meat-color research, was used for the estimation of metmyoglobin in the presence of oxymyoglobin. In the early studies, the authors found a systematic variation when the proportion of metmyoglobin was estimated at individual wave lengths. This was true whether the authors used wave lengths of 540, 575, and 630 mμ, as was recommended by Austin and Drabkin (1935-36) for methemoglobin estimations, or wave lengths of 544, 564, 582 mμ, as was recently reported by Bowen (1949) for metmyoglobin.

When extinction coefficient ratios for mixed pigments were compared with those for pure pigment extracts at critical wave lengths, the authors found that the ratios for 544 to 564 mμ did not fall between the ratios for the two pure pigment extracts as would be expected if the solution

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 ABSTRACTER: Martin Heerdt

9.15 INCIDENCE AND DISTRIBUTION OF INFESTATION BY SPHYRION LUMPI (KROYER) ON THE REDFISH, SEBASTES MARINUS (L.), OF THE WESTERN NORTH ATLANTIC

Templeman, Wilfred and Squires, H. J. (Fisheries Research Board of Canada, Biological Station, St. John's, Newfoundland)
Journal of the Fisheries Research Board of Canada 17, 9-31 (January 1960)

Introduction.--The copepod parasite, Sphyrion lumpi, a member of the family Sphyriidae was first described by Kroyer (1845, 1863) and more recently by Wilson (1919).

The species Sphyrion lumpi (Kroyer) is sexually dimorphic in the adult stages. The males have been described by Wilson (1919). They are about 2 mm. long as adults and are attached to the females. The males of the Sphyriidae do, however, retain their ability to crawl. The female, on the other hand, passes through the copepodid stage and adapts its structure to a fixed attachment in the flesh of a fish. In the western North Atlantic, this usually is a redfish, Sebastes marinus (L.). This paper deals only with the female Sphyrion lumpi. The greatest lengths (exclusive of ovisacs) of the Sphyrion lumpi observed lay between 9 and 80 mm. with very few individuals smaller than 20 mm. in length.

Findings.--Investigations of infestation of redfish by female Sphyrion lumpi in the Newfoundland area showed that in the Labrador area Sphyrion were generally distributed all over the body but with the greatest infestation being in the cloacal region. In the eastern Grand Bank area there was a strongly ventral distribution of the parasite on the trunk with over 40 percent of the parasites in the cloaca. This is contrasted with previously published data from the Gulf of Maine where most of the Sphyrion were situated antero-dorsally, near the base of the spiny first dorsal fin.

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 Reprinted in part

9.13 THE PROBLEM OF NITROGEN METABOLISM IN FISH MUSCLES

Sorvachev, K. F. (Department of Animal Biochemistry, M. V. Lomonosov Moscow State University, Moscow)
Biochemistry (U.S.S.R.) 24, 458-463 (May-June 1959)

During winter starvation under natural conditions, the carp undergo a considerable change in metabolism. In the muscles there is a decreased content of nitrogen, fat, and carbohydrate, and also a decrease in total concentrate of protein of the blood serum (Biokhimiya 22, 872 (1957)).

Electrophoretic study of the protein fraction of carp blood serum for mirror and scaled varieties has shown that the fractional composition in them also depends on ecological conditions. In these, the species differences in composition of the blood serum protein fractions were less pronounced than the differences which occurred in connection with changes in the conditions of habitation and rearing (Zoologich Zh. 36, 737 (1957)).

In the present investigation, the characteristics of nitrogen metabolism of the muscle extractives for mirror and scaled carp under ordinary conditions of habitation during the winter hibernation were studied.

Methods.--The fish were taken from the ponds of the Red Banner State Farm in the Moscow region. Included in the investigation were a group of 3 to 5 two-year-old fish and 15 to 20 one-year-old fish from natural hibernation and from the aquarium. The total nitrogen of the muscles was determined by the Kjeldahl method. Proteins were precipitated from the muscle homogenate by 5 percent trichloroacetic acid, defatted, dried to constant weight, and the protein nitrogen in them determined. In the supernatant liquid, ammonia, amino acids, creatine, creatinine, and components

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 ABSTRACTER: Herman S. Groninger

9.15 LACK OF HAEMOGLOBIN IN A FISH

Stolk, A. (Histological Laboratory, Free University, Amsterdam, The Netherlands)
Nature 185, 625-626 (February 27, 1960)

Introduction.--Specimens of the toad Xenopus laevis that were completely without haemoglobin have been described by De Graaf (1957) and Ewer (1959).

Experimental.--This paper describes an adult male teleost fish, Cichlasoma severum, that appeared to be without haemoglobin. The fish was 72 mm. in length, had lived for about 2 years in a large tank held at 25° C., and was less active than other cichlids of the same litter. During the last few months before it was examined, this fish had lived near the surface of the water and had taken very little food. As a result, it had become emaciated and had almost ceased to respond to external stimuli. Other fish from the same brood, ranged from 109 to 154 mm. in length.

To obtain further information, the investigators killed the fish by decapitation and subjected it to an autopsy. Blood vessles from the fish were white or perfectly colorless except for the chromatophores in their walls. The color of the heart, gills, and kidneys was cream, and the liver was grey. The gall bladder was enlarged and light brown in color. An examination of the blood smears showed that haemoglobin was not identifiable, although erythrocytes were present. A histological investigation showed that the structure of the organs was normal.

Discussion and conclusions.--On the basis of an accumulation of dark-green bile pigment, which was also noted in the toad described by Ewer (1959), the author concluded that an extensive destruction of the haemoglobin had occurred very recently. Ewer's toad also had an enlarged light-brown colored spleen as did this fish. De Graaf maintains that his toad had been without haemoglobin all

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 ABSTRACTER: Martin Heerdt

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of the adenine system were studied. The amino acids were determined by a chromatographic method (Biochem. Z. 326, 433 (1955)).

Results and discussion. --During winter starvation total and protein nitrogen decreased in carp muscle. For scaled carp the loss was 420 mg. N/100 g. wet tissue, and for mirror two-year-old carp the loss was 290 mg. N. In both species the amino acid nitrogen content varied throughout the winter. From fall to spring the content decreased 82.7 mg. in the mirror carp and 50.4 mg. in the muscle of the scaled carp.

The two-year-old carp of both species and the one-year-old mirror carp showed the same amino acids: cystine, lysine, histidine, aspartic acid, glycine, arginine, glutamic acid, α-alanine, and sarcosine. There were, however, species and growth differences in the ratios of the different amino acids.

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its life and implies that growth to maturity is possible in the absence of haemoglobin. Ewer believes that a total anaemic condition is a pathological state that may originate after the adult has become mature. The author concludes that survival without haemoglobin is distinctly possible; however, an animal without haemoglobin cannot be as active as a normal animal.

8.59 (Cross Reference: 3.31, 7.592)

contained a mixture of only the two pigments.

The present investigations were made to study the possibility that some naturally occurring sulfur-myoglobin pigment was present, which might explain the systematic variation in the estimate of metmyoglobin at different wave lengths and the inconsistent extinction coefficient ratios in mixed pigment solutions. Sulfur-containing compounds including hydrogen sulfide gas, hydrogen sulfide water, sodium hydrosulfite, cysteine, glutathione, and 1-amino-2-naphthol-4-sulfonic acid were added to mixed and metmyoglobin pigment solutions in an attempt to exaggerate the systematic variation. The discovery of any evidence of such exaggeration could be considered to indicate the possibility that the added compound occurred naturally in small amounts in the pigment extract and thus explain the observed deviations from expected behavior.

Findings. --No appreciable effects were obtained with glutathione and 1-amino-2-naphthol-4-sulfonic acid. The authors were able to exaggerate the tendency toward systematic differences in the estimation of concentration of metmyoglobin and the extinction coefficient ratios at critical wave lengths both by the addition of hydrogen sulfide water and cysteine. From these studies, the authors conclude that the sulfur-containing pigment described by Keilin may be present in mixed pigment solutions. This pigment seems to persist under conditions which presumably bring about complete conversion of pigments to metmyoglobin, but it appears to be completely converted to cyanmetmyoglobin.

A number of inconsistencies in the spectrophotometric behavior of pigment solutions under the conditions of these experiments indicate further work should be done before evidence of the presence of a third pigment form can be considered conclusive.

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In the Newfoundland area, the major center of infestation of redfish by Sphyrion was off southern Labrador east of Hamilton Inlet Bank. As high as 8 percent of the redfish were found to be infested. Centers of lower infestation were found on the southern part of the eastern slope of the Grand Bank and in the southeastern part of the Gulf of St. Lawrence. Sphyrion were very scarce on the southwestern Grand Bank, the western part of the south coast of Newfoundland, and in the northern part of the Gulf of St. Lawrence. Sphyrion were not noted on redfish from the northeast Grand Bank, Flemish Cap, and from the Nova Scotia Shelf. A study of residual remains, in redfish fillets, of the cephalothorax from individuals of previous Sphyrion generations showed the same centers of abundance but with some spreading of the previously infested fish in two of three areas in the direction of the deep-water current, thus indicating the possibility of very slow migration of some individual redfish with the current.

It is believed that almost all the redfish discussed in this paper are of the mentella type.

0.38 ATP-ASE ACTIVITY AND CONTRACTILE PROPERTIES OF MYOSIN

Ivanov, I. I.; Parshina, E. A.; and Mirovich, N. I. (Leningrad Pediatric Medical Institute)
Biochemistry (U.S.S.R.) 24, 231-235 (March-April 1959)

Solutions of reprecipitated myosin under the influence of high pressure (4000 atm.) lose their ATP-ase activity but retain their ability to dissolve in 0.6 M KCl and to precipitate after dialysis or strong dilution of the salt solution of myosin by water. The viscosity of myosin that does not contain contaminating actomyosin increases under the influence of high pressure. Myosin submitted to the action of high pressure loses the ability to react with actin to form actomyosin.

0.38 EFFECT OF ADENOSINETRIPHOSPHATE (ATP) ON THE CILIARY ACTIVITY AND ITS HISTOCHEMICAL DEMONSTRATION IN THE OYSTER GILL

Usuki, Itaru (Tohoku Univ., Sendai)
Chemical Abstracts 53, 22532a (November 25, 1959)

0.38 INTERMEDIATES IN THE CONVERSION OF MEVALONIC ACID TO SQUALENE BY A RAT-LIVER ENZYME SYSTEM

Witting, Lloyd A. and Porter, John W. (Univ. of Wisconsin, Madison)
Chemical Abstracts 54, 3561f (March 10, 1960)

0.4 THE MECHANISM OF UPTAKE OF LABELED AMINO ACIDS BY PROTEINS

Levyant, M. I.; Levchuk, T. P.; and Orekhovich, V. N. (Institute of Biological and Medical Chemistry, Academy of Medical Sciences, U.S.S.R., Moscow)
Biochemistry (U.S.S.R.) 24, 163-166 (March-April 1959)

In rats submitted to an operation to exclude liver function, radio-active methionine is not included in the composition of the blood albumin molecule. The incorporation of amino acids in the serum albumin occurs only at the time of its formation.

0.4 IONIC REGULATION IN THE BROWN TROUT (SALMO TRUTTA)

Gordon, Malcolm S. (Yale Univ.)
Chemical Abstracts 54, 3768e (March 10, 1960)

0.4 (Cross Reference: 1.953)

SOME EFFECTS OF EXTRACTS OF FETAL WHALE THYMUS GLANDS

Nowell, P. T.; Wilson, A.; and Wilson, H.
Chemical Abstracts 54, 6956c (March 25, 1960)

0.5 (Cross Reference: 2.01)

STUDIES ON THE FOOD POISONING ASSOCIATED WITH PUTREFACTION OF MARINE PRODUCTS

Kawabata, Toshiharu and Suzuki, Shigeru
Bulletin of the Japanese Society of Scientific Fisheries 25, 473-480 (October 1959) (English abstracts, figures, and tables)

VIII. Distribution of L(–)-histidine decarboxylase among Proteus organisms and the specificity of decarboxylating activity with washed cell suspensions of Proteus morganii with special reference to the pH.

IX. Factors affecting the formation of L(–)-histidine decarboxylase by Proteus morganii.

0.5 ANTIBIOTICS IN POULTRY MEAT PRESERVATION DEVELOPMENT IN VITRO OF BACTERIAL RESISTANCE TO CHLORTETRACYCLINE

Vaughn, Reese H.; Ng, Henry; Stewart, George F.; Nagel, Charles W.; and Simpson, Kenneth L.
Applied Microbiology 8, 27-30 (January 1960)

Twenty-five cultures isolated from spoiled poultry meat were subjected to a training procedure by serial transfer into increasing concentrations of chlortetracycline. In general, it was found that the level of resistance attained, after a given number of transfers, was dependent upon the initial resistance of the culture. Several cultures resistant to at least 480 p.p.m. of chlortetracycline were obtained. Evidence is presented to show that the development of resistance to chlortetracycline is a stepwise process. When the trained cultures were compared to the parent strains on the basis of six different characteristics, the majority were identical.

1.125 DEVELOPMENT OF HONEYCOMBING IN HAWAIIAN SKIPJACK TUNA

Otsu, Tamio
Commercial Fisheries Review 19, 1-8 (January 1957)

(Abstract of this article appears under 2.00 page 5 - June 1957)

1.125 OCEANOGRAPHY AND THE HAWAIIAN SKIPJACK FISHERY

Seckel, Gunter H. and Waldron, Kenneth D.
Pacific Fisherman 58, 11-13 (February 1960)

(Abstract of this article appears under 1.0112 page 3 - June 1960)

## GLOSSARY OF COMMON AND SCIENTIFIC NAMES OF FISH AND SHELLFISH*

| Common name | Other common names | Scientific name |
|---|---|---|
| Alewife | Branch herring, big-eyed herring, river herring, | Pomolobus pseudoharengus |
| | Blueback, glut herring, shad herring | Pomolobus aestivalis |
| Anchovy | | Engraulis mordax |
| Cod | Codfish | Gadus morhua (Atlantic) |
| | | Gadus macrocephalus (Pacific) |
| Flounder: | | |
| Gray sole | | Glyptocephalus cynoglossus |
| Lemon sole | | Pseudopleuronectes dignabilis |
| Yellowtail | Dab | Limanda ferruginea |
| Dab | Sea dab | Hippoglossoides platessoides |
| Blackback | Winter flounder | Pseudopleuronectes americanus |
| Fluke | Summer flounder, gulf flounder, flounder | Paralichthys species |
| 'Sole' | | Pleuronectidae and Bothidae species |
| 'California halibut' | | Paralichthys californicus |
| Haddock | | Melanogrammus aeglefinus |
| Halibut | | Hippoglossus hippoglossus (Atlantic) |
| | | Hippoglossus stenolepis (Pacific) |
| Herring: | | |
| Lake | Herring | Leucichthys artedi (Great Lakes, except Erie) |
| Round | | Etrumeus sadina |
| Sea | | Clupea harengus (Atlantic) |
| | | Clupea pallasii (Pacific) |
| Thread | | Opisthonema oglinum |
| Jack mackerel | Horse mackerel | Trachurus symmetricus |
| Lingcod | Cultus cod, blue cod, buffalo cod, ling | Ophiodon elongatus |
| Mackerel | | Scomber scombrus (Atlantic) |
| | | Pneumatophorus diego (Pacific) |
| Crab: | | |
| Blue | | Callinectes sapidus |
| Hard | Hard-shelled crab | Callinectes sapidus |
| Soft and peelers | Soft-shell crab | Cancer magister |
| Dungeness | | Paralithodes camtschatica |
| King | Alaska king crab | Cancer irroratus (New England) |
| Rock | | Cancer species (California) |
| Stone | | Menippe mercenaria |
| Lobster: | | |
| Northern | | Homarus americanus (Atlantic) |
| Spiny | Sea crawfish, rock lobster | Panulirus argus (Atlantic) |
| | | Panulirus interruptus (Pacific) |
| Shrimp | Prawn | Penaeus setiferus (South) |
| | | Penaeus duorarum (Atlantic) |
| | | Penaeus aztecus and |
| | | Xiphopeneus kroyeri Gulf) |
| | | Pandalus species (Atlantic and Pacific) |
| | | Pandalopsis species (Pacific) |
| | | Crago species (Pacific) |
| Menhaden | Mossbunker, pogy, fatback | Brevoortia species |
| Mullet | Jumping mullet, striped mullet, silver mullet | Mugil species |
| Ocean perch: | | |
| Atlantic | Rosefish, redfish, red perch | Sebastes marinus |
| Pacific | | Sebastodes alutus |
| Pilchard | Sardine | Sardinops caerulea |
| Pollock | Boston bluefish | Pollachius virens |
| Rockfish | Rock cod, snapper | Sebastodes species (Pacific) |
| Sablefish | Black cod | Anoplopoma fimbria |
| Salmon: | | |
| Atlantic | | Salmo salar (Atlantic) |
| Pacific: | | |
| Chinook or king | Tyee, spring | Oncorhynchus tshawytscha |
| Chum or keta | Fall, dog | Oncorhynchus keta |
| Pink | Humpback | Oncorhynchus gorbuscha |
| Red or sockeye | Blueback | Oncorhynchus nerka |
| Silver or coho | | Oncorhynchus kisutch |
| Spanish mackerel | Mackerel | Scomberomorus maculatus |
| Tuna and tunalike fishes: | | |
| Albacore | Longfin tuna | Germo alalunga |
| | --- | Thunnus saliens |
| Bluefin | Horse mackerel | Thunnus thynnus |
| | --- | Thunnus secundodorsalis |
| Bonito | | Sarda sarda (Atlantic) |
| | | Sarda chiliensis (Pacific) |
| Little | Bonito, albacore, false albacore | Euthynnus alletteratus |
| Skipjack | Striped tuna | Katsuwonus pelamis |
| Yellowfin | | Neothunnus macropterus |
| Whiting | Silver hake | Merluccius bilinearis |
| Clam: | | |
| Cockle | | Cardium corbis (Pacific) |
| Coquina | Pompano shells | Donax variabilis |
| | Butter | Saxidomus nuttali (Pacific) |
| Hard | Little neck | Paphia staminea (Pacific) |
| | Round clam, cherrystone, quahog, little neck | Venus mercenaria (Atlantic) |
| | | Venus mortoni (Florida) |
| Ocean quahog | | Cyprina islandica |
| Pismo | | Tivela stultorum (Pacific) |
| Razor | | Ensis species (Atlantic) |
| | | Siliqua patula (Pacific) |
| Soft | Soft-shell clam, sand clam, nannynose, maninose | Mya arenaria |
| Surf | Skimmer | Spisula solidissima |
| Oyster: | | |
| Eastern | Cove | Crassostrea virginica |
| Pacific (introduced) | Japanese | Crassostrea gigas |
| Western | Olympia, native | Ostrea lurida |
| Scallop: | | |
| Bay | | Pecten irradians (Atlantic) |
| | | Pecten aequisulcatus (Pacific) |
| Sea | | Pecten magellanicus |

* Taken from Fishery Statistics of the United States 1955. Each species listed was caught in excess of 10,000,000 pounds in 1955.

2.1121 AN EXPERIMENT ON A MID-WATER TRAWL VI. PRACTICAL FISHING EXPERIMENT

Kobayashi, Kiichiro and Inoue, Naoichi
Bulletin of the Faculty of Fisheries, Hokkaido University 10, 15-30 (May 1959) (Hakodate, Japan) (English abstract, figures, and tables)

2.1121 A STUDY ON THE FISHING EFFICIENCY OF THE OTTER TRAWL AND THE TWO-BOAT TRAWL IN OPERATION BY THE SHAPE OF THEIR NET

Hamuro, Chikamasa
Bulletin of the Japanese Society of Scientific Fisheries 25, 103-110 (June 1959) (English abstract, figures, and tables)

The results of measurement on net shape show that the single-boat otter-trawl net operates in a violent state if it is towed rapidly, whereas a two-boat trawl net operates in a natural and reasonable manner because it is towed slowly.

2.1121 STUDIES ON THE KINEMATIC BEHAVIOR OF THE GROUND ROPE OF THE TRAWL NET I.

Kawakami, Tasae and Suzuki, Otohiko
Bulletin of the Japanese Society of Scientific Fisheries 25, 413-416 (October 1959) (In English)

2.3 OCEAN PERCH FILLETING MACHINE SUCCESSFULLY FILLETS YELLOW PERCH

Anonymous
Commercial Fisheries Review 22, 24-25 (January 1960)

A lot of Great Lakes yellow perch shipped from Vermilion, Ohio, was successfully filleted by an ocean perch filleting machine in Gloucester, Massachusetts. The filleting machine had been received from Germany in mid-September 1959 and installed in a Gloucester, Massachusetts, fillet plant. The machine was designed to fillet fish 7 to 14 inches in length. About 85 to 90 percent of the fillets were free from bones. The necessary trimming concerned cutting off a few rib bones, fins, and tag ends. The yield of fillets was about 51 percent by weight.

2.3 ENZYME VISCERATION AND SCALING OF FISH

Meinke, W. W. (Texas Engineering Experiment Station)
Frosted Food Field 30, 52, 66 (February 1960)

The fish to be cleaned, viscerated, and scaled were immersed in a solution of the enzyme until solution of the viscera and scaling had been obtained. The fish were then removed from the enzyme solution and washed free of adhering scales and liquid digest.

2.9 SOME FOODS ARE "HOT"

Anonymous
Chemical and Engineering News 36, 38 (October 27, 1958)

It is true that fish are more radioactive than they were prior to 1945. It also is true that all foods are more radioactive. In fact, fish are among the least radioactive of these foods. Pre- and post-1945 radioactivity in cherries, fish, dairy products, and tea is, respectively, 0.00 and 0.16, 0.00 and 0.32, 0.00 and 0.55, and 0.00 and 31.4 radioactive disintegrations per minute per gram.

2.9 (Cross Reference: 8.51)

NUTRITIVE VALUE OF PROTEINS FROM SHARK (SCOLIODON SORRAKOWAH) AND SKATE (RHYNCHOBATUS DJIDDENSIS). I. AMINO-ACID MAKE-UP AND RATE OF RELEASE OF ESSENTIAL AMINO ACIDS DURING DIGESTION IN VITRO

Mashelkar, B. N. and Sohonie, Kamala (Dept. Biochem. Inst. Sci., Bombay)
Chemical Abstracts 53, 13442a (July 25, 1959)

2.9 BIOCHEMICAL STUDIES ON SQUID MEAT FOOD POISONING VI. THE INHIBITION OF HUMAN SERUM ACETYLCHOLINESTERASE BY THE AMINES OF SQUID MEAT, BEEF AND HOG-FLESH

Murata, Kiichi; and Iida, Atsushi
Bulletin of the Faculty of Fisheries, Hokkaido University 10, 167-172 (August 1959) (Hakodate, Japan)

3.12 A CHEMICAL METHOD FOR DETERMINATION OF CHLORTETRACYCLINE I. A NEW FLUOROMETRIC METHOD

Tomiyama, Tetuo; Yone, Yasuo; and Kitahara, Keiko
Bulletin of the Japanese Society of Scientific Fisheries 25, 234-239 (July 1959) (English abstracts, figures, and tables)

A practical field method is needed for the determination of chlortetracycline incorporated in ice. The method herein reported is based on a linear relationship between the chlortetracycline concentration and the intensity of fluorescence produced on irradiation of aluminum chelate of chlortetracycline with ultraviolet ray.

3.12 EFFECTIVENESS OF DIP IN ICED CHLORTETRACYCLINE (CTC)-CONTAINING SEA WATER ON KEEPING QUALITY OF MACKEREL ABOARD SHIP AND DETERMINATION OF CTC RESIDUES ON THE FISH

Tomiyama, Tetuo and Yone, Yasuo
Bulletin of the Japanese Society of Scientific Fisheries 25, 290-293 (August 1959) (English abstract, figures, and tables)

When mackerel was held in sea water containing about 3 p.p.m. chlortetracycline, the chlortetracycline residues in the muscle and in the skin were found to be only 0.05 p.p.m. and 0.8 p.p.m., respectively. When held in about 6 p.p.m. chlortetracycline-sea water, the residues in the muscle and the skin were found to be 0.09 p.p.m. and 1.25 p.p.m., respectively. The distribution pattern of chlortetracycline in the muscle showed a sharp decrease in the residue within a 5-mm. depth, and no chlortetracycline was found in the muscle at a depth greater than 9 mm. When mackerel was stored at from 3°~7° C. after landing, the storage life of both the chlortetracycline-treated groups was 7 days as compared with 5 days for the control group.

## CONVERSION UNITS

1 pound = 453.59 grams
1 ounce = 28.350 grams
1 inch = 2.5400 centimeters
1 gallon = 128 ounces
1 gallon = 231 cubic inches
1 quart = 0.9463 liters
1 ounce = 29.573 milliliters

## CONVERSION OF TEMPERATURE SCALES

$F = 9/5\ C + 32$

$C = 5/9\ (F-32)$

## SPECIFIC HEAT AND HEAT OF FUSION

Average values of specific heat generally used for fishery products are 0.80 B.t.u. per pound per °F. above freezing and 0.40 B.t.u. per pound per °F. below freezing.

An average heat of fusion generally used for fishery products is 115 B.t.u. per pound. The heat of fusion of ice is 144 B.t.u. per pound.

## DEFINITIONS

calorie ..... heat required to raise the temperature of 1 gram of water 1 degree Centigrade

British thermal unit .....252 calories or the heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit

ton of refrigeration ..... removal of heat at the rate of 12,000 B.t.u. per hour

atmospheric pressure, normal .....a pressure at sea level of 14.696 pounds per square inch, absolute

sensible heat .....heat added to the body when its temperature is changed.

latent heat ..... heat absorbed or evolved during a change of state, with no change of temperature

heat of fusion ..... heat absorbed when a solid melts, with no change of temperature

heat of vaporization ..... heat absorbed when a liquid vaporizes, with no change of temperature

heat of reaction ....., heat evolved or absorbed during a chemical reaction

heat transmission .....flow of heat by conduction, convection, or radiation, singly or in any combination

horsepower ..... work performed at the rate of 550 foot pounds per second

mechanical equivalent of 1 B.t.u. of heat ..... heat given off by a total expenditure of 778 foot pounds of energy

## COMMON ABBREVIATIONS*

| | |
|---|---|
| A. | Ångstrom unit(s) |
| a.c. | alternating current |
| alc. | alcohol, alcoholic |
| alk. | alkaline (not alkali) |
| amp. | ampere(s) |
| anhyd. | anhydrous |
| aq. | aqueous |
| at. | atomic (not atom) |
| at. wt. | atomic weight |
| Bé. | Baumé |
| biol. | biological |
| B.O.D. | biochemical oxygen demand |
| b.p. | boiling point |
| B.t.u. | British thermal unit(s) |
| cal. | calorie(s) |
| cc. | cubic centimeter(s) |
| cm. | centimeter(s) |
| d. | density ($d_{13}$ specific gravity at 13° referred to water at 4°; $d_{20}^{20}$, at 20° referred to water at the same temperature) |
| d.c. | direct current |
| e.m.f. | electromotive force |
| Et | ethyl ($Et_2O$, ethyl ether) |
| e.v. | electron volt(s) |
| f.p. | freezing point |
| ft. | foot, feet |
| g. | gram(s) |
| γ | microgram(s) |
| hr. | hour |
| in. | inch(es) |
| kcal. | kilocalorie(s) |
| kg. | kilogram(s) |
| kv. | kilovolt(s) |
| kv.-amp. | kilovolt-ampere(s) |
| kw. | kilowatt(s) |
| kw.-hr. | kilowatt-hour |
| l. | liter(s) |
| lb. | pound(s) |
| m. | meter(s); also (followed by a figure denoting temperature) melts at, melting at |
| M. | molar (as applied to concn.) |
| ma. | milliampere(s) |
| Mc. | megacycle |
| mc. | millicurie |
| Me | methyl (MeOH, methanol) |
| meq. | milliequivalent |
| m.e.v. | million electron volts |
| mg. | milligram(s) |
| ml. | milliliter(s) |
| mm. | millimeter(s) |
| mγ | millimicrogram |
| mμ | millimicron(s) |
| mol. | molecule, molecular |
| mol. wt. | molecular weight |
| m.p. | melting point |
| μ | micron(s) |
| mv. | millivolt(s) |
| n | index of refraction ($n_D^{20}$ for 20° and sodium light) |
| N | normal (as applied to concn.) |
| petr. ether | petroleum ether |
| p.p.m. | parts per million |
| ppt. | precipitate |
| pptd. | precipitated |
| pptg. | precipitating |
| pptn. | precipitation |
| qual. | qualitative (not qualitatively) |
| quant. | quantitative (not quantitatively) |
| r.p.m. | revolutions per minute |
| sol. | soluble |
| soln. | solution |
| sp. gr. | specific gravity |
| sp. heat | specific heat |
| sp. vol. | specific volume |
| sq. cm. | square centimeter(s) |
| U.S.P. | United States Pharmacopeia |
| v. | volt(s) |
| vol. | volume (not volatile) |
| w. | watt(s) |
| wt. | weight |

* These abbreviations are used by Chemical Abstracts and, accordingly, have wide recognition.

3.19 (Cross Reference: 0.321)

EFFECT OF γ-IRRADIATION ON SOLUTIONS OF HEMOGLOBINS

Oppel, V. V. (Laboratory of Biochemistry, Department of Physiology of Military Labor, S. M. Kirov Order of Lenin Military Medical Academy, Leningrad)
Biochemistry (U.S.S.R.) 24, 414-423 (May-June 1959)

3.19 TREATMENT OF MEATS WITH IONISING RADIATIONS. III. RADIATION PASTEURISATION OF WHOLE EVISCERATED CHICKEN CARCASSES

Coleby, B.; Ingram, M.; and Shepherd, H. J. (Low Temperature Station, Downing St., Cambridge, England)
Journal of the Science of Food and Agriculture 11, 61-71 (February 1960)

Whole eviscerated chicken carcasses were irradiated with γ-radiation from $Co^{60}$, using varying doses up to 1 megarad. When the meat was stored at 1°C., a dose of 0.8 megarad gave a fivefold extension of the time required for putrefactive spoilage, and the flavor changes after such a dose usually were not noticed in roasted chickens. The quality of the irradiated carcasses tended to deteriorate during storage. This deterioration was apparent when the chickens had been in storage approximately one and a half times the period required for spoilage of untreated carcasses stored at 1°C. The deterioration is not due to oxidative rancidity of the lipids.

3.231 OPEN DAY AT TORRY LABORATORY

Anonymous
World Fishing 8, 56-58 (August 1959)

(Abstract of this article appears under 9.4 page 19 - January 1960)

3.231 MOVABLE TABLE FOR STACKING CARCASSES OF FROZEN MEAT IN REFRIGERATION PLANTS

Gural'nik, M.
Kholodil'naya tekhnika No. 5, 53-54 (1959) (U.S.S.R.)

The article describes a movable table used in refrigeration plants for stacking carcasses of frozen meat. The table consists of a metal stand on wheels and a wooden platform with three drop leaves measuring in all 3,260x1,300 mm. The table is intended to take a wheel barrow loaded with carcasses from a lift truck, which picks it up from the floor, places it on the table and returns it after being emptied. There are: 1 set of diagrams and 1 photo.

3.4 APPLICATION OF LIQUID SMOKE IN MEAT INDUSTRY

Sokolov, A. (Technol. Inst. Meat and Dairy Ind., Moscow)
Chemical Abstracts 54, 6991c (March 25, 1960)

3.4 A RAPID DETERMINATION OF THE SMOKE PHENOLS PENETRATING SMOKED SAUSAGES

Kurko, V. I. (All-Union Sci.-Research Inst. Meat Ind., Moscow)
Chemical Abstracts 54, 6991a (March 25, 1960)

3.4 ANTIOXIDATIVE PROPERTIES OF THE SMOKE COMPONENTS

Kurko, V. I. (All-Union Sci.-Research Inst. Meat Ind., Moscow)
Chemical Abstracts 54, 6990g (March 25, 1960)

3.4 PRESERVATION OF MARINE PRODUCTS. I. EFFECT OF SEASONING, HEATING, AND SEALING UPON THE GROWTH OF MOLD ON SMOKED SQUID

Sakamoto, Takayuki and Okuda, Yukio (Hokkaido Doritsu Suisan Shikenjo, Hokkaido)
Chemical Abstracts 54, 5975g (March 25, 1960)

3.5 BACTERIA CONCERNED IN THE SPOILAGE OF HADDOCK : PRELIMINARY PAPER

Gee, A. H.
Contributions to Canadian Biology and Fisheries (New Series) 3, No. 14, 347-364 (1927)

(Abstract of this article appears under 0.5 page 1 - June 1960)

3.5 THE PRESERVATION OF SALTED FISH AND PACKAGING WITH POLYETHYLENE

Lafont, R.
Chemical Abstracts 53, 15412i (August 25, 1959)

3.5 THE FACTORS IMPEDING AND ACCELERATING THE PROCESS OF RUSTING OF SALTED FISH

Mel'nikova, E. A. (Kuban Med. Inst., Krasnodar)
Chemical Abstracts 53, 20607e (November 10, 1959)

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Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Biochemistry and Physiology
Canadian Journal of Chemical Engineering
Canadian Journal of Chemistry
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Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
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Food Engineering
Food Manufacture
Food Preservation Quarterly
Food Processing
Food Research
Food Technology
Frosted Food Field
Industrial and Engineering Chemistry
Industrial Refrigeration
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Bacteriology
Journal of Biochemistry (Japan)
Journal of Biological Chemistry
Journal of Lipid Research
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Japanese Biochemical Society
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
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Modern Refrigeration
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National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Poultry Science
Progressive Fish-Culturist
Quick Frozen Foods
Science
Seafood Merchandising
Trade News (Fisheries Department, Canada)
Western Canner/Packer
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above-listed publications are included. Biological papers are generally omitted.

4.13 ON THE OCCURRENCE OF EICOSATETRAENOIC, DOCOSAPENTAENOIC AND DOCOSAHEXAENOIC ACIDS IN FISH OILS

Toyama, Y.; Iwata, Y.; and Fujimura, K. (Aus. dem Institut fur Angewandte Chemie der Technischen Fakultat der Nagoya Univerisitat, Nagoya, Japan)
Fette-Seifen-Anstrichmittel 61, 846 (October 1959)

The authors have isolated eicosatetraenoic acid from sardine oil and docosapentaenoic and docosahexaenoic acids from the saury fish oil in the form of their methyl esters. On the basis of ozonolysis, the authors assign the following configuration to these acids: 5, 8, 11, 14-eicosatetraenoic acid; 4, 7, 10, 13, 16-docosapentaenoic acid and 4, 7, 10, 13, 16, 19-docosahexaenoic acid.

4.13 PAPER CHROMATOGRAPHIC STUDIES ON THE FATTY ACID COMPOSITION OF SOME FRESH WATER CRUSTACEANS

Farkas, T. and Herodek, S. (Hung. Acad. Sci., Tihany)
Chemical Abstracts 54, 4928a (March 10, 1960)

4.13 OCCURRENCE OF β-AMINOISOBUTYRIC ACID IN MYTILUS EDULIS

Awapara, J. and Allen, K. (Rice Inst., Houston, Texas)
Chemical Abstracts 54, 4930i (March 10, 1960)

4.29 CHEMICAL PROPERTIES OF OILS IN GAMMA-RADIATION FISH MEAT AND PRODUCTS. PART 1.

Kaneda, Takashi; Sakai, Hisae; and Ishii, Seinosuke
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 11, 909-919 (1959) (English abstract and tables)

When the fatty abdominal meat from tuna is exposed to 1,000,000 r of gamma radiation from a cobalt-60 isotope, the meat becomes dark brown in color, an offensive odor appears, and the oil from the meat becomes rancid. Irradiated fish sausage did not show any marked changes in palatability even in the presence of fish fat.

4.29 PREPARATION OF A COATING MATERIAL BY CHLORINATION OF FISH OIL IV. CHANGE OF MOLECULAR WEIGHT OF FISH OIL CAUSED BY CHLORINATION

Suzuki, Kosaku
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 12, 1008-1011 (1959) (English abstract, figure, and table)

4.91 EFFECT OF SATURATED AND UNSATURATED FATTY ACIDS ON DIETARY LIPOGRANULOMA

Herting, David C.; Harris, Philip L.; and Crain, Richard C. (Distillation Products Industries, Rochester, New York and Armed Forces Institute of Pathology, Washington, D. C.)
Journal of Nutrition 70, 247-251 (February 1960)

Earliest occurrence of lipogranuloma was observed after 2 weeks in rats maintained on a diet that contained completely saturated fat (acetylated monoglycerides made from hydrogenated lard). Fat-cell reaction did not appear to a significant degree when the ratio of unsaturated to saturated fatty acid was 1.0 or greater, but it increased in incidence and severity as the ratio decreased below 1.0.

4.91 EFFECTS OF CERTAIN PURE LONG-CHAIN POLYUNSATURATED FATTY ACID ESTERS ON THE BLOOD LIPIDES OF MAN. USE OF POLYUNSATURATED FATTY ACIDS IN ATHEROSCLEROSIS

Worne, H. E. and Smith, L. W. (Natl. Foundation for Metabolic Research, Erlton, N. J.)
Chemical Abstracts 54, 2516d (February 10, 1960)

4.91 EFFECTS OF ESSENTIAL-FATTY ACID DEFICIENCY AND X-RADIATION ON THE PLASMA CHOLESTERYL ESTER SPECTRUM OF THE RAT

Howton, David R. and Hashimoto, Sam (Univ. of California, Los Angeles)
Chemical Abstracts 54, 5848e (March 25, 1960)

6.10 IMPORTANCE OF INDUSTRIAL FISHERIES

Piskur, Frank T.; Snyder, Donald G.; and Karrick, Neva L.
Fishing Gazette Annual Review Number 77, 170-172, 174-175, 229 (1960)

6.10 FISH MEAL MARKETING SUGGESTIONS FOR THE SMALL PRODUCER

Robas, John S.
Fish Boat 5, 45 (April 1960)

Assuming that a small plant is producing 2 to 4 tons of finished meal per day, where should the operator look for his market? The first and best places are the local feed mills and farmers who operate on a large scale. These customers always need fish meal and are interested in a steady, dependable source of good quality meal. They usually are willing to pay a small premium above the going market price because little or no freight is involved and they often will send their own truck to pick up the meal. For the small operator who is not willing to bother with day-to-day sales problems there are a number of brokerage firms that will handle sales for a modest brokerage. An alert broker can be of invaluable assistance to the beginning trash fish operator, since he will probably be an expert on quality and can act as a consultant to the producer on certain phases of his operation.

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6.193 RAT BIOASSAY OF UNIDENTIFIED GROWTH FACTORS IN POLLOCK FISH SCALES

Snyder, Donald G. (Bureau of Commercial Fisheries, College Park, Maryland)
Commercial Fisheries Review 21, 13-16 (February Supplement-1959)

Data are presented that indicate the presence of fair amounts of unknown growth factors in pollock fish scales when fed to rats in a special diet containing a thyroid stress factor. Thus, in addition to earlier feedings, further evidence is presented to suggest that fish scales may have value as a feed supplement in the diets of farm animals.

6.193 STUDIES WITH CHICKENS AND TURKEYS ON THE RELATIONSHIP BETWEEN FAT, UNIDENTIFIED FACTORS AND PELLETING

Pepper, W. F.; Slinger, S. J.; and Summers, J. D. (Ontario Agricultural College, Guelph, Ontario, Canada)
Poultry Science 39, 66-74 (January 1960)

Both pelleting and the addition of fat to the feed resulted in fairly consistent improvement in feed efficiency. In general, the effect of pelleting on feed efficiency tended to be less as the fat level increased.

The results suggest that there may be a sparing relationship between fat and unidentified factor sources for the growth of turkeys. It would also appear that fish meal and dried whey increase body weight almost entirely by increasing feed intake.

6.195 THE AMINO ACID REQUIREMENT OF THE GROWING CHICK FED A CRYSTALLINE AMINO ACID DIET

Klain, G. J.; Scott, H. M.; and Johnson, B. Connor (Illinois Agricultural Experiment Station, Urbana)
Poultry Science 39, 39-44 (January 1960)

The percentage requirement for each of the amino acids, calculated from regresssion curves, was found to be L-lysine, 1.01; L-tryptophan, 0.17; L-threonine, 0.58; L-leucine, 1.68; L-histidine, 0.41; DL-methionine, 0.47 (in the absence of L-cystine); DL-methionine, 0.18 (in the presence of 0.40 L-cystine); L-phenylalanine, 0.59; L-tyrosine, 0.71; L-isoleucine, 0.73; L-valine, 0.83; L-arginine, 1.08; and L-glutamic acid, 15.77 percent, respectively.

6.195 THE BIOLOGICAL EVALUATION OF PROTEIN QUALITY

Oser, B. L.; Carson, S.; and Oser, M. (Food and Drug Research Laboratories, Inc., Maspeth, New York)
Federation Proceedings 19, Part I, 326 (March 1960)

Evaluations of the protein quality of bread, grains, cereals, casein, nonfat milk solids, and dried egg protein were studied at several feeding levels of protein based either on isonitrogenicity or nitrogen x a factor. Amino acid supplementation of a series of gluten, cereal, and bread samples were examined at one or more levels of dietary protein intake. Only protein sources of minor or moderate efficiency were significantly improved by lysine supplementation.

6.54 EDIBLE PROTEIN PRODUCTS FROM FISH SOLUBLES

Milner, Jermiah (to Joymol (Proprietary) Ltd.)
Chemical Abstracts 53, 8475d (May 10, 1959)

6.54 STUDIES ON THE NUTRITIONAL VALUE OF DEFATTED FISH FLOUR

Morrison, A. B. and Campbell, J. A. (Food and Drug Lab., Dept. Natl. Health and Welfare, Ottawa, Canada)
Federation Proceedings 19, Part I, 326 (March 1960)

Fish flour was added to whole wheat flour or to white bread prior to baking, and the mixtures were fed to growing male rats at a 10-percent protein level. Addition of 2, 4, or 6 lb. of fish flour per 100 lb. of wheat flour increased the protein efficiency ratio in a stepwise manner, from 1.49 to 2.80 but had no effect on organ weights of liver lipid levels. Protein efficiency ratio values for bread and flour diets were found to be a direct function of the lysine content of the diet.

7.82 STUDIES OF FISH SPOILAGE VIII. VOLATILE ACID OF COD MUSCLE PRESS JUICE

Collins, V. K.
Journal of the Fisheries Research Board of Canada 5, No. 3, 197-202 (July 1941)

(Abstract of this article appears under 2.01 page 5 - June 1960)

7.82 STUDIES ON FRESHNESS DETERMINATION OF FISH MEAT BY THE DISTILLATION RATIO OF VOLATILE ACIDS VIII. ON THE FORM OF VOLATILE ACIDS IN FISH MEAT

Asakawa, Suezo
Bulletin of the Japanese Society of Scientific Fisheries 23, Nos. 7 and 8, 463-466 (1957) (English abstract, tables, and figure)

The present study was made to survey the kinds of volatile fatty acids present and their change during the deterioration of fish meat. Using the minced meat of a kind of bluefin tuna as a test material, volatile acids were fractionated into free, salt, and ester forms. The fractions obtained were examined for their component fatty acids by paper chromatography. The salt form was most abundant through all stages of deterioration. The results of a chromatographic study suggested that the component fatty acids in the free and salt forms were gradually replaced by the higher volatile acids with the progress of deterioration.

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